Archaeology of the Ganga Basin

Paradigm Shift

Editor
Vibha Tripathi

Associate Editor
Prabhakar Upadhyay

R
930.1
TRI-A

147624

गुरुकुल काँगड़ी विश्वविद्यालय, हरिद्वार
कृपया पुस्तक के ऊपर कोई निशान
आदि न लगायें।

पुस्तकालय
गुरुकुल काँगड़ी विश्वविद्यालय, हरिद्वार

वर्ग संख्या R 930.1 TRI-A आगत संख्या 147624

पुस्तक विवरण की तिथि नीचे अंकित है। इस तिथि सहित ३० वें दिन यह पुस्तक पुस्तकालय में वापस आ जानी चाहिए अन्यथा ५० पैसे प्रतिदिन के हिसाब से विलम्ब दण्ड लगेगा।

Stock Verification-2024

930.1,TRI-A
147624

ARCHAEOLOGY OF THE GANGA BASIN

PARADIGM SHIFT

ARCHAEOLOGY OF THE GANGA BASIN

PARADIGM SHIFT

Vol. I

Editor
Vibha Tripathi

Associate Editor
Prabhakar Upadhyay

पुस्तकालय
147624
गुरुकुल कांगड़ी विश्वविद्यालय

SHARADA

SHARADA PUBLISHING HOUSE
DELHI

930.1,TRI-A
147624

All rights reserved. No part of this publication may be reproduced in any form or by any means, without written permission of the publisher/author.

The responsibility for the facts stated, opinions expressed or conclusions reached is entirely that of the contributors and the Author and the Publisher takes no responsibility.

R
930·1
TRI—A

First Published 2010
© Vibha Tripathi (b. 1948)

ISBN: 978-81-88934-65-2
Rs. 5500 (2 Vol. Set)

Published by:
Anjana Bansal
Sharada Publishing House
111, Vidya Vihar Apartment
Sector-9, Rohini, Delhi-110 085 (INDIA)
Ph.: +91-11-3292 1560, 2755 2102
E-mail: books@sharadabooks.com;
bansal_sph@rediffmail.com
Website: www.sharadabooks.com

Printed at:
Salasar Imaging Systems
Delhi

FOREWORD

Half-a-century ago a book like the present one could not have been written and half-a-century hence, or perhaps much earlier, the book will have to be rewritten. Over the decades, the archaeological evidence has been accumulating, not in arithmetic but geometric proportions, and hopefully will continue to do so in the foreseeable future. Hence there is need for a time-to-time re-assessment.

The Partition of India in 1947 robbed India of practically all the sites of the world-renowned Harappan Civilization dating back to the 3rd millennium BC. Maybe this was a blessing in disguise, since it gave a wake-up call to Indian archaeologists who threw themselves heart and soul into extensive field-work and have by now put on the map of India hundreds of sites of this civilization, both in Gujarat and in the Sarasvati valley. In fact, as of now, there are many time more sites of this civilization in the Sarasvati valley than in the Indus, which has prompted scholars to re-name this civilization as the Indus-Sarasvati or even just Sarasvati Civilization.

This new-born zeal did not remain confined to the Sarasvati valley alone. It spilled over to the neighbouring Ganga valley as well, and what we find in this valuable book is the end-product of all that labour – exploration, excavation and an in-depth analysis of the evidence so obtained. The ball was set rolling by a leading archaeologist of Allahabad, the late Professor G.R. Sharma, and since then a number of eminent field-workers have contributed their mite to the great effort of unveiling a picture of the rise of civilization from a humble Mesolithic/Neolithic stage, through a Chalcolithic one leading on to the Early Iron Age when a full-fledged civilization, with all its trappings, began to emerge. In due course of time, there appeared systematic town-planning, writing and a system of coinage with, of course, cross-country trade and commerce.

Right from the Colonial times we have witnessed a down-playing of Indian Civilization, both by foreign scholars and their devout Indian followers. This is once again clearly reflected in the attitude these scholars have adopted towards the discovery of cultivated rice which, for example at Lahuradewa, is assignable to the 7th millennium BC. To my mind, in a debate like this two kinds of unimpeachable evidences are needed. One, that the material should be identified for certain by a competent palaeo-botanist and two, the dating of this material should be done by a reliable C-14 laboratory. Both these requirements have duly been met with, yet a murmur remains in the air. I am sure in the course of time this murmur too will die out with the discovery of more samples of domesticated rice and an assessment of their C-14 dates.

At the end, I would like to congratulate all the authors on their valuable contributions and, of course, the lady, Professor Vibha Tripathi, on her skill and enthusiasm in organizing the seminar of which the present work is the outcome.

October 21, 2009

B.B. Lal

Dedicated to
My Teachers and Mentors

CONTENTS

Foreword v

Preface xv

List of Contributors xix

List of Illustrations xxv

Volume - I

M.K. Dhavalikar
The Ganga Civilization: A Processual Perspective 1

Vibha Tripathi
Archaeology of the Ganga Plain: Need for a Paradigm Shift 12

Dilip K. Chakrabarti
Problems and Perspective of the Ganga Plain Archaeology 42

Umesh C. Chattopadhyaya
From Cultivation of Food Resources to the Cultivation of Social Relationships: A Critique of Near Eastern Neolithic Narratives in the Light of Archaeological Evidence from the Vindhya-Gangetic Complex 53

R.P. Pandey
Late Quaternary Formations in the Ganga Valley 79

V.D. Misra 83
Descent of Man in the Middle Ganga Plain

M.D.N. Sahi 94
Neolithic Culture of the Ganga Valley: A New Perspective

V.D. Misra & Pragya Misra 123
Neolithic Culture of the Middle Ganga Valley

J.N. Pal 134
Early Farming Culture of the Middle Ganga Plain: Origin, Evolution, Chronology and Main Features

Mohd. Naseem 151
The Neolithic Culture of the Saryupar Region

K.S. Saraswat 155
Agricultural Background of the Early Farming Communities in the Middle Ganga Plain

Ranjit Pratap Singh 194
Beginning of Agriculture in the Ganga Plain

Ajay Pratap 203
Exploring the Highlands South of Ganga Valley: The Case of Rajmahal Hills, Santhal Parganas, Jharkhand

D.P. Sharma, Madhuri Sharma & Ajit Kumar Choudhary 214
New Copper Hoard in Upper Ganga Plain

D.N. Dimri 228
Recent Archaeological Discoveries at Ahichchhatra: An Appraisal

Anup Mishra 237
Archaeological Investigations in Deoha River Valley with Special Reference to Excavations at Abhaipur, District Pilibhit, Uttar Pradesh

G.K. Lama 258
Archaeological Exploration in Western Uttar Pradesh: A Brief Report

Purushottam Singh 263
Chalcolithic Culture of the Middle Ganga Plain

Rakesh Tewari 277
Changing Dimensions of Pre-Iron Age Cultures of the Middle Ganga Plain

Volume - II

Asok Datta 305
Impact of Iron Technology on Economic Growth in Eastern India (Proto-historic Period) – An Overview

Rupendra K. Chattopadhyay, Goutami Bhattacharya and Paromita Bose 314
Archaeology of the Lower Ganga Valley: Some Aspects of Cultural Sequence

Sunil Kumar 348
Megalithic Culture of Southern Uttar Pradesh: An Appraisal

Ravindra Kumar 359
Researches in the Middle Gomati Basin: Scope for Further Investigations

D.P. Agrawal and Vasudha Pant 366
Interaction of Knowledge Systems & Ganga Valley Urbanisation

Naina Pandey 375
Process of Urbanization in the Gangetic Valley: Archaeological Perspective

B.R. Mani 381
Kushans in Ganga Plains: Confirmatory Evidence and Impacts

Vibha Tripathi, Prabhakar Upadhyay and Surendra Kumar Yadav 387
A Fresh Paradigm for Interpreting Settlements of the Ganga Plain with Special Reference to Anai Excavations

Nidhi Pandey 401
Bankat - A Satellite Settlement in the Kausambi Region

Shahnaj Husne Jahan 407
Merchant Community and the State in Bengal During the Gupta Era

Prabhakar Upadhyay 421
Mineral Resource for Ancient Cultures of the Middle Ganga Plains: A Brief Investigation of the Potential Areas

Niharika 443
Beads of Varanasi with Special Reference to Rajghat and Sarnath

A.K. Kanungo 451
Antiquity of Glass in India: Excavations at Kopia

Nupur Dasgupta & Pranab K. Chattopadhyay 477
Artisans of Old Copper Alloy Craft Tradition in Lower Ganga Valley (Early Historic to Early Medieval Period)

C. Margabandhu 491
Art of Clay-modelling in the Early Historic Sites of Central Ganga Valley – A Study of Some Representative Type of Decorated Plaques

P.K. Agrawala 507
Identification of Kumbhanda Figures in Early Terracottas of the Gangetic Plain

Usha Rani Tiwari & Durga Nandan Tiwari 514
Buddha in Sambodhi – In the Context of Sarnath School

Ajay Srivastava 518
Some Master Pieces of Sarnath Museum

Amar Singh 529
Architecture of Early Buddhist Monasteries in the Middle Ganga Plain

Devendra Handa 538
Pañchāla Coins: Sovereigns, Symbols and Significance

Pranabananda Jash 545
Gangasagarasangama: A Pilgrim Center of the Lower Gangetic Region

Suman Jain 550
A Palaeographical Study of the Middle Ganga Valley Region

Surendra Kumar Yadav 562
Rediscovering an Old River Aruna in Kashi: Ecological and Archaeological Perspective

A.K. Sinha 572
The Materialistic Leanings of Some Upanishadic Philosophers

PREFACE

Archaeology of the Ganga Plain has come long way since the pre-independence days. The 'Buddhist sites' had attracted the attention of doyens of Indian archaeology of the British period. Important sites mentioned in literature were located. Many were excavated. Monastic settlements lying buried saw the light of the day. Subsequently, a fresh paradigm to archaeological investigations was introduced by Wheeler. He not only brought in scientific excavation techniques to be adopted in 'archaeology from the earth,' he laid great emphasis on stratigraphy and relative chronology. He equally emphasized on methodical recording of facts and finds. Wheeler, writing the foreword to Personality of India by B. Subbarao (1958: viii) wrote, "The first stage is one of limited knowledge and restricted inference (often wrong). Upon this follows the accumulation of scraps of evidence which tend to constitute an untidy and incoherent heap only later, when this 'heap' has sufficiently grown and matured, does it begin to take an assured place in the landscape."

Since Wheeler's time not only the 'heap' has grown but the landscape has also expanded. Talking in the specific context of the archaeology of Ganga Plain, it has come a long way with extensive explorations and excavations going on regularly over the decades. Within the area, in-depth explorations have been conducted on selected river valleys, and district-wise village to village surveys. A few horizontal excavations have also been conducted providing a clearer picture of ancient cultures. However, new models of understanding cultures with processual and post-processual archaeology have placed greater challenges before investigators. In light of these new conceptual frameworks, the excavations need to be re-planned and research schemes re-oriented. With new ideas and theories the role of scientifically discovered material and their interpretation assume greater significance today. The term "paradigm" in such context was first used by Thomas

S. Kuhn in 'The Structures of Scientific Revolutions' (1962 & 1970, University of Chicago Press, Chicago & London). This term has gained momentum and wider ramifications since then. In the present context our concern is a review and re-examination of material remains with fresh angle. Our emphasis should now be on a more holistic reconstruction of cultures using multi-pronged approach.

The archaeology of the Ganga Plain has undergone changes over last few decades. The so called Dark Age is not dark any more. We have a clear idea of cultural sequence. The gaps that existed between different cultural periods are now nearly filled up. An example in the case is the hiatus between Harappan and the succeeding PGW culture in the Indo-Gangetic Divide. We have now come across a late-Harappan-PGW overlap in the Saraswati-Yamuna basin in Punjab-Haryana. The Harappan and OCP/Copper-Hoard interaction is an evidence of intrusion of (late) Harappans in the Yamuna-Hindon Doab with rich jewellery at Mandi and having extensive cemetery at Sanauli. We need to work out a new paradigm for study of these cultural phases. The gap between Stone Age and metal using cultures is consistently narrowing down with new researches. The Neolithic-Early farming cultures are yielding dates that push back the beginning of agriculture in the Ganga Plain to 7th-6th millennium BC. Iron appears in the region in a Chalcolithic milieu. The ^{14}C dates take back antiquity of iron in the Ganga Plain to the early part of the second millennium BC. This calls for a review of three Age classification of cultural evolution in human history.

Urbanization of the Ganga Plain and NBPW culture has been almost synonymous. Use of baked bricks, changes in architectural scheme showing certain level of sophistication, introduction of script, coinage, craft specialization, trade-commerce and growing inter-regional communication are closely associated with NBPW culture. The antiquity of the culture is consistently being pushed back. We have got a number of carbon fourteen dates for NBPW period ranging between 1200-900 BC. These dates, if corroborated further from more sites should have a strong bearing on cultural scenario. It is high time that beginning of urbanization in the Ganga Plain is viewed in light of such early evidence.

These facets of the archaeology of the Ganga Plain call for a paradigm shift in approach to study of material remains coming forth from sites of the region. New models and approaches are called for to reconstruct the personality of cultures of the Ganga Plain. It is with application of a holistic approach that we can re-write the history of Ganga Plain termed by Mortimer Wheeler as the 'Ganges Civilization' in the late fifties. Though the term 'civilization' appeared inapt at that time but it proves almost prophetic. It was on the foundation of smaller settlements having Neolithic-Chalcolithic antecedents that the *Janapadas* of the early literature assumed the shape of *Mahajanapadas* on which rests the edifice of Imperial dynasty of Magadh that united the subcontinent into a 'Nation'. Language, literature, art, craft, technology, trade-commerce, international diplomacy - all achieved great heights. But the process took several centuries. How did it happen? Through what kind of stages did it go through? We need to seek answer through study of the past in a more systematic way by adopting fresh approaches.

A National seminar on 'Studies on the Ganges Civilization : The Shifting Paradigm' was organized by the Department of Ancient Indian History, Culture & Archaeology in Banaras Hindu University from 10-12 February, 2006. It was aimed to bring scholars together to underline and discuss the need for a paradigm shift in archaeology of the Ganga Plain in light of new researches going on for decades. Scholars working on important issues of archaeology of the Ganga Plain came on a platform to thrash out the current problems faced by researchers due to fast pouring in of new information and divergent models of interpreting data. A generation of senior and eminent scholars like Professors M.D.N. Sahi, P. Singh, V.C. Srivastava, V.D. Misra, D.P. Agrawal, C. Margabandhu, K.S. Saraswat, Devendra Handa and D.K. Chakrabarti came forward to contribute valuable ideas to the theme.

There is a genre of not so young scholars who have taken the lead in exposing evidence by working in different parts of the Vindhya-Ganga region, some working in quite inaccessible or even dangerous terrains. The exuberance and dynamism of such scholars sets the pace for future researches in the archaeology of Ganga Plain. Dr. Rakesh Tewari, Dr. B.R. Mani, Prof. J.N. Pal, Prof. R.P. Pandey and several others have been working ceaselessly in remote areas and regularly reporting their findings for the benefit of all. The papers in the volume cover almost the entire gamut of cultural spectrum in the Ganga Plain. The thought provoking discussions on the Mesolithic Culture by Prof. V.D. Misra and on the Neolithic of the Vindhyas by Prof. J.N. Pal and U.C. Chattopadhyaya are insightful indeed. The Neolithic period has also been taken up for discussion by Prof. Naseem. For an effective reconstruction of ancient cultures application of scientific tools are inevitable. In an attempt to excavate the famous site of Ahichchhatra in district Bareilly the Archaeological Survey of India collaborated with IIT, Kanpur. The results of this joint venture are reported here by D.N. Dimri, the Director of that excavation.

There are scholars working abroad like Prof. D.K. Chakrabarti of Cambridge University who have tirelessly worked year after year to trace inter-regional routes that add new dimensions to archaeology of the region in particular and India in general. Prof. Shahnaj Husne Jahan of University of Liberal Arts, Dhaka, Bangladesh is a sincere and dedicated researcher who has been working in the archaeology of the Ganga Plain in Bangladesh. Her contribution to the volume is indeed valuable. Art with its visual impact is an important source of cultural reconstructions. The contributions of C. Margabandhu, Prof. P.K. Agrawala and Prof. Amar Singh add to the discourses in a particular way. Drs. Asok Datta, P.K. Chattopadhyay and Nupur Dasgupta have written on technology and it's cultural implications.

Religion and philosophy have been closely interlinked with Ganga Plain, Ganga being the most revered river worshipped as the Mother in India. The papers of Prof. Pranabananda Jash and Prof. A.K. Sinha have gone into the depths of this valuable aspect of life of the Ganga Plain which has several religious centres attracting hordes of pilgrims throughout the millennia. It is heartening to see that the next generation of scholars is ready to accept the challenges of the discipline. We have papers of Dr. Ajay Pratap, Dr. A.K. Kanungo, Dr. Ravindra Kumar, Dr. Suman Jain, Dr. Usha Rani Tiwari and Dr. Durga Nandan Tiwari, Dr. G.K. Lama, Dr. R.P. Singh, Dr. Naina Pandey, Dr. Nidhi Pandey, Dr. Prabhakar Upadhyay, Dr. Niharika, Sri Ajay Srivastava, Dr. S.K. Yadav and others. These scholars have thrown light on various aspects of archaeology and culture of the Ganga Plain.

There are a large number of young researchers who participated and contributed to discussions during the seminar but could not write their papers. I express my thankfulness to them and hope that they will add to the knowledge base of culture of the Ganga Plain in times to come.

I take this opportunity to pay homage to my senior colleague Prof. P.C. Pant who enthralled the listeners, especially the young students and research scholars with his lucid but critical review of growth of culture in the Ganga Plain from the Stone Age to the Historical Era. We never knew that this is going to be the last opportunity to hear him. We are fortunate to be a witness to that brilliant exposition of Late Prof. P.C. Pant. Let his soul rest in peace.

The discourses that took place were extremely fruitful. Most of the papers are outcome of deliberations that took place during the seminar. However, many new subjects and authors have joined in and contributed papers to be incorporated in the present volume. I will not be honest if, I don't recount my trial and trepidations in collecting the papers for the volume. I give all the credit to my assistant editor Dr. Prabhakar Upadhyay for the perseverance he exhibited in pursuing the contributors for sending their papers. Umpteen numbers of calls, e-mails had to be made for procuring the papers for the volume. But I am grateful to all the contributors for making this volume see the light of the day. I am extremely grateful to Prof. M.K. Dhavalikar for most graciously agreeing to write the keynote address that sets the tone of the theme of the volume. Last but not the least, I find no words to express my gratitude to Prof. B.B. Lal for blessing this volume by writing its foreword.

I will like to thank the UGC for funding the seminar under the SAP and ASIHSS programme which I was co-coordinating then. I will also like to thank the authorities and colleagues in the department of AIHC & Archaeology of Banaras Hindu University for their support and co-operation. I am also thankful to Mrs. Anjana Bansal, Sharada Publishing House for bringing out this volume within such a short time.

I dedicate this volume to all the archaeologists who have worked in the field of archaeology of the Ganga Plain. It was their tireless effort that the human civilization lying buried in the depths of darkness beneath earth could see the light of the day.

Kartik Purnima
2nd November, 2009 **Vibha Tripathi**

List of Contributors

Dr. A.K. Kanungo
Deccan College Post-Graduate and Research Institute
Pune
kanungo_alok@hotmail.com

Prof. A.K. Sinha
Department of Ancient History & Culture
M.J.P. Rohilkhand University
Bareilly

Dr. Ajay Pratap
Department of History
Banaras Hindu University
Varanasi
drajayprt@yahoo.com

Dr. Ajay Srivastava
Assistant Superintending Archaeologist
Archeological Survey of India
Archaeological Museum
Sarnath
ajay.arch@gmail.com

Ajit Kumar Choudhary
Department of AIHC and Archaeology
Banaras Hindu University
Varanasi

Prof. Amar Singh
Department of Ancient History and Archaeology
University of Lucknow
Lucknow
amarsingh_lu@rediffmail.com

Dr. Anup Mishra
Department of Ancient History & Culture
M.J.P. Rohilkhand University
Bareilly
mishraanup@rediffmail.com

Prof. Asok Datta
Department of Archaeology
University of Calcutta
Kolkata
akd19@rediffmail.com

Prof. B.B. Lal
Former Director General
Archaeological Survey of India
Janpath, New Delhi

Dr. B.R. Mani
Joint Director General
Archaeological Survey of India
Janpath, New Delhi
brmani@hotmail.com

Dr. C. Margabandhu
Former Director
Archaeological Survey of India
New Delhi

Dr. D.N. Dimri
Superintending Archaeologist
Archaeological Survey of India
Dehradun Circle
Dehradun

Prof. D.P. Agrawal
Director
Lok Vigyan Kendra
East Pokharkhali
Almora-263601
dpalmora@gmail.com

Prof. D.P. Sharma
Director
Bharat Kala Bhawan
Banaras Hindu University
Varanasi
dpsharma54@gmail.com

Prof. Devendra Handa
Former Professor
Punjab University
Chandigarh
1401, PUSHPAC Complex
Sector 49 B, Chandigarh-160047
devendrahanda@rediffmail.com

Prof. Dilip K. Chakrabarti
Former Professor
South Asian Archaeology
University of Cambridge
U.K.
dc129@cam.ac.uk

Dr. Durga Nandan Tiwari
Department of Archaeology and Museology
Sampunanada Sanskrit University
Varanasi

Dr. G.K. Lama
Department of AIHC and Archaeology
Banaras Hindu University
Varanasi

Goutami Bhattacharya
Department of Archaeology
University of Calcutta
Kolkata

Prof. J.N. Pal
Department of Ancient History, Culture and Archaeology
University of Allahabad
Allahabad
jnpal@hotmail.com

Dr. K.S. Saraswat
Scientist (Retd.)
Birbal Sahni Institute of Palaeobotany
Lucknow

Prof. M.D.N. Sahi
Former Professor
Department of History
Aligarh Muslim University
Aligarh

Prof. M.K. Dhavalikar
Former Director
Deccan College Post-Graduate and
Research Institute
Pune

Dr. Madhuri Sharma
C2/2, Old Jodhpur Colony
Banaras Hindu University
Varanasi-221005

Prof. Mohd. Naseem
Department of AIHC and Archaeology
Banaras Hindu University
Varanasi

Dr. Naina Pandey
Lecturer
Arya Mahila Post-Graduate College
Banaras Hindu University
Varanasi

Dr. Nidhi Pandey
Department of AIHC and Archaeology
Banaras Hindu University
Varanasi
nidhi769@gmail.com

Dr. Niharika
Lecturer
Sri Agrasena Kanya Autonomous Post
Graduate College
Varanasi

Dr. Nupur Dasgupta
Department of History
Jadavpur University
Kolkata

पुस्तकालय
147624

Prof. P.K. Agrawala
Emeritus Professor
Department of AIHC and Archaeology
Banaras Hindu University
Varanasi

Paromita Bose
Institute of Archaeology
Archaeological Survey of India
New Delhi

Dr. Prabhakar Upadhyay
Department of AIHC and Archaeology
Banaras Hindu University
Varanasi

Pragya Misra
Department of Ancient History, Culture
and Archaeology
University of Allahabad
Allahabad

Dr. Pranab K. Chattopadhyay
Centre for Archaeological Studies and
Training
Kolkata
pranab.chattopadhyay@gmail.com

Prof. Pranabananda Jash
Visva-Bharati
Santiniketan
pjash43@yahoo.co.in

Prof. Purushottam Singh
Former Professor
Department of AIHC and Archaeology
Banaras Hindu University
Varanasi

Prof. Rakesh P. Pandey
School of Studies in AIHC and Archaeology
Jiwaji University
Gwalior
rppandey01@rediffmail.com

Dr. Rakesh Tewari
Director
U.P. State Archaeology
Roshan-ud-Daula Kothi
Kaiserbagh
Lucknow - 226 001
rakesh.tewari53@gmail.com

Dr. Ranjit Pratap Singh
Department of AIHC and Archaeology
Banaras Hindu University
Varanasi
dr.ranjitbhu@rediffmail.com

Dr. Ravindra Kumar
Associate Professor
Delhi Institute of Heritage Research and Management
18-A, Satsang Vihar Marg
New Delhi-110030
ravindra_kumar1101@rediffmail.com

Dr. Rupendra K. Chattopadhyay
Head of the Department of Archaeology
University of Calcutta
Kolkata
r_chattopadhyay@rediffmail.com

Dr. Shahnaj Husne Jahan
University of Liberal Arts
House 56, Road 4/A, Satmosjid Road
Dhanmondi R/A
Dhaka -1209
Bangladesh
adri_12002@yahoo.com

Dr. Suman Jain
Department of AIHC & Archaeology
Banaras Hindu University
Varanasi
sumanaihc@gmail.com

Dr. Sunil Kumar
Director
Manav Evam Prakriti Unnayan Samiti
Varanasi
sunilmanas@rediffmail.com

Dr. Surendra Kumar Yadav
Department of AIHC and Archaeology
Banaras Hindu University
Varanasi

Prof. Umesh C. Chattopadhyaya
Department of Ancient History, Culture and Archaeology
University of Allahabad
Allahabad
ucc1953@gmail.com

Dr. Usha Rani Tiwari
Department of AIHC and Archaeology
Banaras Hindu University
Varanasi
urt.richa@gmail.com

Prof. V.D. Misra
Former Professor
Department of Ancient History, Culture
and Archaeology
University of Allahabad
Allahabad

Dr. Vasudha Pant
Lok Vigyan Kendra
East Pokharkhali
Almora-263601

Prof. Vibha Tripathi
Department of AIHC and Archaeology
Banaras Hindu University
Varanasi
vibhahist@gmail.com

LIST OF ILLUSTRATIONS

R.P. Pandey
Late Quaternary Formations in the Ganga Valley
Fig. 1. Quaternary stratigraphy of the Ganga valley

M.D.N. Sahi
Neolithic Culture of the Ganga Valley: A New Perspective
Fig. 1. Chronology as presently accepted

J.N. Pal
Early Farming Culture of the Middle Ganga Plain: Origin, Evolution, Chronology and Main Features
Fig. 1. Main archaeological sites in the Ganga plain and neighbouring Vindhyas
Illus. 1. Hut floor, Jhusi
Illus. 2. A burnt plastered floor enclosed by two parallel mud walls, Jhusi
Illus. 3. Cording pattern on pottery, Jhusi
Illus. 4. Bone arrowheads, Jhusi

K.S. Saraswat
Agricultural Background of the Early Farming Communities in the Middle Ganga Plain
Map 1. Important early archaeological sites located in upper and middle Ganga plain (Uttar Pradesh & Bihar)
Fig. 1. Chronological sequence of cereals and legumes

Fig. 2. Chronological sequence of cereals and legumes

Ajay Pratap

Exploring the Highlands South of Ganga Valley: The Case of Rajmahal Hills, Santhal Parganas, Jharkhand

Fig. 1. Spatial contexts of Paharia tool – use

D.P. Sharma, Madhuri Sharma and Ajit Kumar Choudhary

New Copper Hoard in Upper Ganga Plain

Illus. 1. Copper anthropomorphic figure of type-I long arms, short leg type, harpoon, hooked swords from Sapai excavation, ASI, New Delhi, Neg. No. 1010-97

Illus. 2. Copper anthropomorphic figure of type-II long leg, short arm type from Chandausi, National Museum, New Delhi, Acc. No. 76-60, Neg. No. 945-2000

Illus. 3. Three copper anthropomorphic figure of type-IV long arms without legs from Madarpur loan from ASI, National Museum, New Delhi, Acc. No. 66.18 III, II A and No. 9; Neg. No. 946-2000 and 939-2000

Illus. 4. Copper anthropomorphic figure of type-II long legs and short arms type from Bisauli, Bharat Kala Bhawan, Varanasi

Illus. 5 (a-b). Copper harpoons of type-III length 36.8-44.3 cm, weight 475-1000 gm, barbs on tip to shaft from Rewari (Rajasthan), Hansi and other sites in Haryana, Jhajjar Museum Collection, Neg. No. 2785-86 and 2782-86

Illus. 6. Copper weed chisel or *kurpi*, with and without tang and from different sites of middle Ganga-Yamuna doab, National Museum, New Delhi; Acc. No. 87-22, 21, 12, 1, 16, 9, 17 and 25; Neg. No. 3896-87

Illus. 7. Copper shouldered axes of different shape from sites of middle Ganga-Yamuna doab, National Museum, New Delhi; Neg. No. 2996-86

Illus. 8. Copper chisels from different sites of Ganga-Yamuna doab, National Museum Collection; Acc No. 87.22/8,87.22/887.79/12, 87.22/7 and 87.79/1; Neg. No. 3895-87

Illus. 9 (a-b). Copper bar axes from different sites of Haryana, Jhajjar Museum, Haryana; Neg. No. 2787-86

Illus. 10. Copper flat axes from different sites of lower Ganga-Yamuna doab, National Museum, New Delhi; Neg. No. 3000-86

Illus. 11. Ochre coloured ceramic's and Copper Hoard sites (*circa* 2800-1100 BC)

Illus. 12. Anthropomorphic figure of type-one arm missing Jaorakhera (Kanpur) now in private collection of Mr. Chisti at Amroha

Illus. 13. Anthropomorphic figure of type-I short arms and long leg type doab area, National Museum, New Delhi

Illus. 14. Anthropomorphic shape Shani Devata Ganga-Yamuna doab Modern, National Museum, New Delhi
Illus. 15. Anthropomorphic figure of type-IV Badau, now in private collection of western U.P.
Illus. 16. Anthropomorphic figure of type-IV Badau, now in private collection of western U.P.
Illus. 17. Group of antennae sword from lower Ganga-Yamuna doab type-III smaller size, private collection, Allahabad
Illus. 18. Antennae sword from lower Ganga-Yamuna doab type-III smaller size, private collection, Allahabad
Illus. 19. Antennae sword from Sahabad Ganga-Yamuna doab type-I, National Museum, New Delhi

D.N. Dimri
Recent Archaeological Discoveries at Ahichchhatra: An Appraisal
Illus. 1. Satellite image of Ahichchhatra
Illus. 2. A view of stone lingam
Illus. 3. View of *stupa* mound
Illus. 4. View of Temple I
Illus. 5. View of Temple II
Illus. 6. View of fort wall
Illus. 7. View of excavated fort wall
Illus. 8. Crucibles
Illus. 9. Section showing the deposit of crucibles and waste
Illus. 10. Massive brick structure
Illus. 11. A view of excavated structure
Illus. 12. Brick well
Illus. 13. Human head
Illus. 14. Carnelian beads
Illus. 15. View of brick platform
Illus. 16. Remain of Temple
Illus. 17. Pots

Anup Mishra
Archaeological Investigations in Deoha River Valley with Special Reference to Excavations at Abhaipur, District Pilibhit, Uttar Pradesh
Illus. 1. Copper Hoards of Bisalpur
Illus. 2. Location map of site of Abhaipur

Illus. 3. Stratigraphy of northern section, Trench E3
Illus. 4. Artifacts of PGW period
Illus. 5. Bone workshop, Trench E3
Illus. 6. Ceramics of PGW period
Illus. 7. Position of adult and child burials
Illus. 8. Soil cover of adult burial
Illus. 9. Soil cover of child burial
Illus. 10. Close up of adult burial
Illus. 11. Close up of child burial
Illus. 12. Brick well of NBPW period

G.K. Lama
Archaeological Exploration in Western Uttar Pradesh: A Brief Report
Illus. 1. General view of the mound at Alamgirpur, district Meerut
Illus. 2. General view of the mound at Sirsalgarh, district Baghpat
Illus. 3. Mound at Buland Khera, Gautam Buddha Nagar, Uttar Pradesh

Asok Datta
Impact of Iron Technology on Economic Growth in Eastern India (Proto-historic Period) – An Overview
Illus. 1. Indigenous iron smelting using a mud cylindrical furnace by the Kols of Dumka, Bihar
Illus. 2. Fragments of burnt mud pieces with traces of iron (BRW), Dihar, Bankura
Illus. 3. Iron slags from BRW level at Pakhanna, Bankura
Illus. 4. Broken iron chisel (BRW), Mangalkot
Illus. 5. Iron chisels, nail, rod and nozzle, BRW level, Mangalkot
Illus. 6. Iron slags and unidentified objects, BRW level, Mangalkot

D.P. Agrawal and Vasudha Pant
Interaction of Knowledge Systems & Ganga Valley Urbanisation
Illus. 1. Anthropomorphs of the Copper Hoard type from Pithoragarh district, Uttarakhand (courtesy: G.B. Pant Museum, Almora)

Vibha Tripathi, Prabhakar Upadhyay and Surendra Kumar Yadav
A Fresh Paradigm for Interpreting Settlements of the Ganga Plain with Special Reference to Anai Excavations
Map 1: Hydrogeomorphological map of river Varuna
Map 2: Exploration in Varuna region

Nidhi Pandey

Bankat - A Satellite Settlement in the Kausambi Region

Fig. 1. Location map, Bankat
Fig. 2. Pottery and terracotta discs, Bankat
Illus. 1. Copper coins, Bankat
Illus. 2. Terracotta figurines, Bankat

Prabhakar Upadhyay

Mineral Resource for Ancient Cultures of the Middle Ganga Plains: A Brief Investigation of the Potential Areas

Map 1. Exploration in Sonbhadra
Illus. 1. Iron Mine at Kirwani, Sonbhadra, Uttar Pradesh

A.K. Kanungo

Antiquity of Glass in India: Excavations at Kopia

Fig. 1. Glass and/or glass bead production centres in ancient India
Fig. 2. Evidence of glass and glass beads in Indian Archaeology between 1200-600 BC
Fig. 3. Evidence of glass and glass beads in Indian Archaeology between 600-300 BC
Fig. 4. Evidence of glass and glass beads in Indian Archaeology between 300 BC - 400 AD
Fig. 5. Evidence of glass and glass beads in Indian Archaeology between 400-1300 AD
Fig. 6. Evidence of glass and glass beads in Indian Archaeology between 1300-1800 AD
Fig. 7. Contour map of Kopia, district Sant Kabir Nagar
Fig. 8. Location map of Kopia
Fig. 9. Stratigraphy of Kopia at SE quadrant of OB1 (section facing west)
Fig. 10. Stratigraphy at AACX4 (section facing north)
Fig. 11. Stratigraphy at AWX31 (section facing west)
Fig. 12. Line drawings of structures at locality I
Fig. 13. Section of fortification
Fig. 14. Structures in locality II (northern deposit)
Fig. 15. Structures in locality II (north-west deposit)
Fig. 16. Reconstructed pot crucibles
Illus. 1. Glass beads from Harappa (courtesy: Kenoyer)
Illus. 2. Glass beads from Sanauli (after Sharma *et al*. 2006)
Illus. 3. Mound of Kopia
Illus. 4. Trenches at locality I
Illus. 5. Step water tank
Illus. 6. Furnace pit in AWX32
Illus. 7. Present day furnace in Jalesa (courtesy: Sode)

Illus. 8. Three terracotta containers from Layer 1 in AY1
Illus. 9. Pot with *nandipada* (red slipped ware)
Illus. 10. A crocodile shaped mouthpiece from Layer 1 in AX1
Illus. 11. An *in situ* NBP dish in Layer 12 in OB1
Illus. 12. A Sunga period terracotta
Illus. 13. A Kushan period lady terracotta figurine
Illus. 14. A skin scrubber with *triratna* (surface)
Illus. 15. A ram made in NBP technology from Layer 11 in OB1
Illus. 16. Arrow heads
Illus. 17. Coins from Kopia
Illus. 18. A terracotta seal
Illus. 19. Glass beads, drawn tubes and rods
Illus. 20. Glass bangles
Illus. 21. *In situ* glass slags and firing activities
Illus. 22. Glass pieces from Kopia
Illus. 23. Comparison of rim pieces between that of Kopia and Papanaidupet
Illus. 24. *Reh* in nearby places

C. Margabandhu
Art of Clay-Modelling in the Early Historic Sites of Central Ganga Valley – A Study of Some Representative Type of Decorated Plaques
Illus. 1. *Purna ghata* motif, Jhusi, district Allahabad
Illus. 2. Reverse of the plaque
Illus. 3. *Purna ghata* motif, Chirand, district Saran
Illus. 4. Motif of *purna ghata* upper part, Kausambi, district Allahabad
Illus. 5. Reverse of the plaque
Illus. 6. Pot and foliage motif in spiral decoration, complete, Kausambi, district Allahabad
Illus. 7. Details, reverse of the plaque
Illus. 8. Complete moulded plaque depicting *purna ghata* motif, Rajghat, district Varanasi
Illus. 9. Details, reverse of the plaque
Illus. 10. Plaque depicting a lady in toilet, Mathura, district Mathura
Illus. 11. Lady in toilet in circular plaque, Mathura Museum, district Mathura
Illus. 12. Plaque depicting female horse rider, Kausambi, district Allahabad
Illus. 13. Details, reverse of the plaque
Illus. 14. Male rider on horse possibly a warrior, Kausambi, district Allahabad
Illus. 15. Details, reverse of the plaque
Illus. 16. Circular plaque, a male rider on horse, Bangarh, district Dinajpur
Illus. 17. Circular plaque, female rider on horse, Mangalkot, district Burdwan

Illus. 18. Motif depicting a lion and a squirrel upper part broken, Kausambi, district Allahabad
Illus. 19. Reverse of the plaque, Details
Illus. 20. Anthropomorphic vessel, full shape, Bhikanapahari, Patna
Illus. 21. Anthropomorphic vessel, full shape, Buxar, district Shahabad
Illus. 22. Globular vessel in human shape, head is missing, Bhita, district Allahabad
Illus. 23. Human shaped vessel without head, Purana Qila, district south Delhi
Illus. 24. Details, side portion of the vessel
Illus. 25. Human shaped vessel without head, Sonkh, district Mathura
Illus. 26. Vessel in human shape with missing head, Mathura, Mathura Museum
Illus. 27. Ahichchhatra, Reserve collection of antiquities, ASI, New Delhi

P.K. Agrawala

Identification of Kumbhand Figures in Early Terracottas of the Gangetic Plain

Illus. 1. Nude Kumbhanda demon, blowing wide pipe, late Sunga period, terracotta moulded plaque from Kosam (now in the BHU Museum)
Illus. 2. A female Kumbhanda, properly called Kumbhandi, terracotta moulded plaque, *c.* 1st century BC - *c.* 1st century AD from Chandraketugarh (now in the National Museum, New Delhi)
Illus. 3. Grotesque figure of a Kumbhanda, carrying an elephant in his left hand while chewing a boa held in the right, terracotta plaque from Chandraketugarh, *c.* 1st century BC - *c.* 1st century AD (after S.S. Biswas, 1981, pl. LIV a)
Illus. 4. Grotesque Kumbhanda gana carrying a tortoise item of his food, terracotta plaque from Chandraketugarh, *c.* 1st century BC - *c.* 1st century AD (after *IAR*-1966-67, pl. 49B)
Illus. 5. Grotesque nude figure, presumably another type of the Gana Kumbhanda, terracotta moulded plaque from Kosam, *c.* 50 BC - *c.* 100 AD
Illus. 6-8. Pot-shaped figures with human attributes, *c.* 1st-2nd century AD from Mathura

Usha Rani Tiwari and Durga Nandan Tiwari

Buddha in Sambodhi – In the Context of Sarnath School

Illus. 1. The enlightenment scene, Sanchi, 2nd century BC, middle panel of northern torana
Illus. 2. The enlightenment scene, Mathura, 1st century AD, Government Museum, Mathura
Illus. 3. The assault of Mara, Gandhara, 1st century AD, Gai Collection, Peshawar
Illus. 4. The enlightenment scene, Sarnath, 5th century AD, Indian Museum, Kolkata
Illus. 5. The enlightenment scene, Sarnath, 5th century AD, Sarnath Museum, Varanasi
Illus. 6. The enlightenment scene, Sarnath, 5th century AD, Sarnath Museum, Varanasi
Illus. 7. The enlightenment scene, Sarnath, 4th-5th century AD, Indian Museum, Kolkata
Illus. 8. The enlightenment scene, Sarnath, 5th century AD, National Museum, New Delhi
Illus. 9. The enlightenment scene, Sarnath, 6th century AD, Allahabad Museum, Allahabad

Illus. 10. The enlightenment scene, Sarnath, 6th century AD, Sarnath Museum, Varanasi
Illus. 11. The enlightenment scene, Bodhgaya, early 9th century AD, Mahanta's compound, Bodhgaya

Ajay Srivastava
Some Master Pieces of Sarnath Museum
Illus. 1. Lion capital, Sarnath, Mauryan period
Illus. 2. Bodhisattva, Kushan period
Illus. 3. *Chhatra* (umbrella), Kushan period, Sarnath Museum
Illus. 4. Buddha, Gupta period, Sarnath
Illus. 5. Slab showing eight scenes from the Buddha's life, Gupta period
Illus. 6. Tara, Medieval period, Sarnath Museum

Amar Singh
Architecture of Early Buddhist Monasteries in the Middle Ganga Plain
Fig. 1. Sketch Plan, Jivakamravana
Fig. 2. Ghositarama monastery, Kausambi
Fig. 3. Key Plan of structures, Piprawa
Fig. 4. Key Plan of structures, Ganwaria
Fig. 5. Plan, Nalanda monastery

Devendra Handa
Pañchāla Coins: Sovereigns, Symbols and Significance
Fig. 1. Reverse devices of some Pañchāla coins
Fig. 2. Pabhosa inscription
Fig. 3. Coins of Agnimitra showing differences in devices and palaeography
Illus. 1. Pañchāla coins (not to scale)
Illus. 2. Pañchāla coins (not to scale)

Surendra Kumar Yadav
Rediscovering an Old River Aruna in Kashi: Ecological and Archaeological Perspective
Map 1. Rivers and water bodies in Varanasi as per James Princep, 1822
Map 2. Rivers channels in Varanasi district

M.K. DHAVALIKAR

The Ganga Civilization: A Processual Perspective

The beginning of the historical period in the 6th century BC marks the rise of the Ganga civilization which also represents the second urbanization characterized by the emergence of towns many of which were the capitals of the *Mahajanapadas*. Sir Mortimer Wheeler once observed that "The Indus has given India her civilization and the Ganga, her faith," but it is well known that the Ganga has also given us a great civilization which reached its zenith in the centuries around the Christian era and declined in the early medieval period. Its history is now more or less clear and the factors responsible for its growth have also been analysed, but not much is known as to why did it come into being and developed and declined. Although attempts have been made to explain its different stages, the evidence cited in support is mostly literary. As a matter of fact much has been made of the stage marking its zenith – the Golden Age – but doubts are now being raised as to how much "Golden" was that "Age" (Sharma 1987). It is therefore, pertinent to re-examine the different stages of the Ganga civilization, study its process and explain the ups and downs on the basis of concrete evidence furnished by excavations. This can be done only by employing new paradigms.

The application of new paradigms in archaeology goes back to the sixties of the last century when revolutionary changes were introduced in archaeological theory by Lewis Binford (1972: 20-32) and David Clarke (1979: 21-81) as a result of which the discipline came to be known as "New Archaeology". But now it is no more new, and goes by the name "Processual Archaeology", which aims at studying the process of culture with special emphasis on the explanation of culture change. In simple terms, the main difference between the traditional and processual archaeology is that the former dealt with what happened in the past, whereas the chief objective of the latter is 'why' did it happen. This marks a paradigm shift in archaeology. Processual archaeology is mainly concerned with ecology, social and economic archaeology, settlement and subsistence patterns and so on for which the application of paradigms borrowed from other disciplines such as anthropology, geography, ecology and others goes a long way in achieving the goal. It will, therefore, be of great interest to analyze the various stages of the Ganga civilization and explain how and why the changes took place in it through the centuries.

The antiquity of settled life in the Ganga valley now goes back to the 7th-6th millennium BC as recent excavations at Lahuradeva and related sites would show (Tewari *et al.* 2002-03). There, however, appears a huge hiatus after the first farmers abandoned their settlements in 5th-4th millennia. They were again occupied in the beginning of the second millennium BC by agro-pastoralists who were probably the Vedic Aryans as suggested by the legend of Videgha Mathava who, with his priest Gotama Raghugana, went as far east as the Sadanira river (present Gandak in Bihar), and cleared land by burning for cultivation (*S.Br.* I, 4, 1, 10-19). From then onwards, there is evidence of continuous habitation up to the beginning of the historical period. But these Chalcolithic and Iron Age communities remained poor all through a millennium and half and could not achieve the urban status. This is quite enigmatic and needs explanation for the simple reason that iron technology was introduced by 1500 BC (Tewari *et al.* 2001-02), and the metal is supposed to be the prime mover of the second urbanization. The question that naturally arises as to why the people in the Ganga valley, the most fertile region in the country, remained village folk for a thousand years from 1600 BC to 600 BC inspite of their knowledge of iron technology. If the Iron Age people remained poor for such a long time, why did then the urbanization come into being in the 6th century BC, developed into Golden Age and then declined. There must be some important factors which were at work in causing these ups and downs in this glorious civilization. It is the main aim of my Address.

The Ganga civilization originated in the Ganga basin, more particularly between Pataliputra and Sravasti, whence it spread in course of time all over the Indo-Gangetic plain and central India, in the 6th-5th century BC, reached the Deccan in the 4th-3rd century BC, and later still in South India in the 2nd-1st century BC. Scholars have proposed different phases of its development, mainly on the basis of the occurrence of NBPW (Sinha 1969; Erdosy 1993: 104; Chakrabarti 1973; Gupta 1974). However, since the civilization did not end with NBPW or with the Guptas, but continued till the advent of the medieval period. I have, therefore, divided its entire span into the following five stages:

1. Nascent: 600 BC -300 BC.

2. Efflorescent: 300 BC - 0 AD.
3. Zenith: 0 AD - 300 AD.
4. Degeneration: 300 AD - 600 AD.
5. Decline: 600 - 1200 AD.

Processual Archaeology

The different stages of the Ganga civilization can be fruitfully studied from a processual perspective. The roots of the New Archaeology propounded by Binford (1972: 20-32) can be traced back in the 'conjunctive' approach advocated by Walter Taylor (1948), but Binford introduced a paradigm shift in the ultimate goal of archaeology from culture history to culture process which is to be attained by explanation of culture change. The general systems theory or systematics is a framework for analyzing living systems. In archaeology, according to him, culture is a system consisting of a number of sub-systems such as settlement pattern, subsistence strategies, socio-economic organization, religious beliefs and so on. The underlying assumption is that any change in any sub-system can effect change in the functioning of the entire system, and consequently, the culture change can be explained by the application of scientific methodology. This can be achieved by employing the hypothetico-deductive method, which essentially consists of framing a hypothesis and testing the evidence against it. This allows us to draw law-like generalizations (Nomothetics). Binford himself has given excellent examples of the employment of this method which has a very wide application in different disciplines. The initial concern, as outlined by Binford was with ecology and systematics, but later social and even cognitive factors were added (Hodder 2002). When Binford propounded the tenets of New Archaeology in America, on the other side of the Atlantic, David Clarke (1979: 21-81) gave the clearest exposition of the new methodology consisting of new paradigms, viz. (1) Ecological paradigm, (2) Morphological paradigm, (3) Geographical paradigm and (4) Anthropological paradigm.

It will be interesting to analyze the data in respect of the Ganga civilization in the perspective of these paradigms. However, I am painfully aware that the archaeological data at our disposal is very meager because in India historical archaeology has not received the attention it merits. It is presumed that we have a plethora of literary evidence for this and archaeological testimony, therefore, may not be of much help. In fact in the excavation of ancient sites the historical strata is treated as a hindrance, for the main goal is to reach the proto-historic levels. As it is, most of our excavations are small scale digs, carried out for building culture sequences, and even in that the historical strata is ignored. This state of affairs should not perpetuate. We have such extensive sites like Kausambi and Vaishali, and a wealth of literary data, and the combination of both will throw important light on our ancient civilization. I only hope the new generation of Indian archaeologists will bear this in mind when executing their projects.

Ecological Paradigm

It has often enough been said that "India is rich, but Indians are poor". Is it not paradoxical that the country is immensely rich in natural resources, but since we lack the technology to exploit them, we could not make much progress. The most important resource for human life is water, and we are supposed to be incredibly rich in it. Many parts of the country get adequate rainfall, but since the monsoon is known for its vagaries, we cannot harvest it for lack of technology. It only falls during the four months from June to September while the remaining eight months are dry. The monsoon rainfall is so important that even budget of Government of India depends on it. As agriculture is the backbone of our economy and is dependent on the monsoon, it is rightly said that agriculture in India is a gamble with nature, with every third year, a bad year, and every fourth, a famine. Thus our fate is tied to the monsoon cycle; and it is, therefore, evident that we prosper when we get a good rainfall, and suffer when it is poor. And if this conclusion is valid today when we have made considerable technological progress, one can imagine what must have happened in the ancient past when our ancestors were solely at the mercy of the nature.

The most important component of our environment, thus is the monsoon rainfall and if we obtain data about it in the ancient past, it can throw a welcome light on the different stages of the Ganga civilization. But studies on our ancient environment are far too poor and our knowledge in this respect is next to nothing. There is, however, one source which is of great help, and that is the data in respect of Nile flood levels in Egypt which is available for the last five thousand years, the earliest one going back to 2900 BC. It may be questioned as to what Nile floods have to do with Indian monsoon. In this respect it may be stated that the Nile gets its floods because of the rainfall in Ethiopian Highlands, which causes floods in the Blue Nile originating in that region; it joins the White Nile near Khartoum on the southern border of Egypt and the river is flooded. And the rainfall in Ethiopia is the same as our south-west monsoon, on which Nile levels are dependent. This has been scientifically established by Gilbert Walker, former Director General of the Meteorology Department who studied the rainfall pattern of India and north-east Africa from 1840-1910 (Walker 1986: 16-22). The Nile data will therefore be of immense help to us in making projections about the behaviour of monsoon in antiquity, more particularly from 600 BC - 1200 AD.

The Nile data is quite reliable and tallies very well with the Indian evidence, howsoever, poor (Dhavalikar 2002). In the early historical period, from about 400 BC - 300 AD, the Nile had high floods indicating a good monsoon in Ethiopia and it can therefore be taken to be fairly adequate in India too. This is corroborated by Kautilya's Arthashastra (II, 24, 116). In this context it should be noted that the early period from 6th century BC to 3rd century AD witnessed the rise of great empires all over the Old World, with Hellenistic and Roman in Europe, Achaemenian and Sassanian in West Asia, Han in China and in India too, from the Mauryas to the Guptas. The extremely arid phase of the second millennium and the first half of the first millennium BC came to an end in the 5th century BC and the environment started improving which made the second urbanization possible. New regions were colonized, agricultural yield increased, trade flourished with neighbouring countries and with improved economic conditions, urbanization ushered in. This marks the beginning of the Ganga civilization.

The rainfall pattern further increased during 400 BC - 300 AD as recorded by Kautilya, with 13 *dronas* in the Ashmaka country (central Maharashtra), 23 *dronas* in Avanti and immense quantity in western countries, the borders of the Himalayas, and the countries where water channels are made use of in agriculture (*Arthashastra* II, 24, 5). The rainfall was thus higher than at present, and there was need to protect the capitals of the *Mahajanapadas* from floods. Excavations have revealed that many urban centres were provided with earthen embankments as a measure of flood protection as at Sravasti, Rajgir and Kausambi (Mate 1969-70) which were later extended into ramparts. Canals were dug in different parts of the country. The Hathigumpha inscription refers to a large canal dug by a Nanda king (5th century BC) which was extended by Kharavela. Another canal of the Maurya period has been discovered at Vidisha (*ARASI* 1914-15: 69-71). Mention should also be made of the huge water reservoir built at Sringaverapura on the banks of the Ganga in the 2nd-1st century BC (Lal 1993).

It may not be out of place to mention here that Kautilya (II, 14, 18) has devoted considerable attention to water harvesting and management. We come across some of the water lifting devices such as those operated by hand (*hasta-pravartinam*) and mechanism for flowing channels (*srota-yantra*), and for lifting water from rivers, tanks, lakes and wells (*nadi-sarastataka-kupodghatam*). There was also a separate class of hydraulic engineers (*odayantrikas*) (Luders' List No. 1137) to maintain water systems.

The favourable environment continued till about the fourth century AD and there are signs of degeneration thereafter. The Nile levels started getting lower and lower, indicating poor rainfall in India. Nearly half of the settlements were abandoned in the Gupta period as the evidence from excavations demonstrates. The conditions further worsened so much that habitation continued, albeit in a poorer form, at hardly 30% of the sites. Land grants were given for perpetual enjoyment (*aksaya-nivi*) on a large scale as a result of which many new villages came to be settled where grant land was situated. Towns and cities were abandoned and exodus began to rural areas. Agriculture suffered tremendously and consequently, many people started subsisting on pastoralism whereas artists and craftsmen started practicing other professions such as fortune telling as is clear from the Mandasaur inscription of the silk weavers guild of the time of Kumaragupta. In the post-Gupta era, the country was dotted by small kingdoms ruled by petty chiefs whose ancestors were pastoralists such as the Abhiras and the Yadavas. Toward the close of the millennium Islamic incursions began and the decline of the civilization is complete.

Morphological Paradigm

The morphological paradigm consists of the application of statistical methods which aid in making a study precise. David Clarke (1979: 21-81) has demonstrated how statistical procedures go a long way in making precise statements with a scientific basis. I am not aware if any statistical analysis of pottery from the Ganga valley has so far been done. We did it for the Jorwe painted pottery and find that it is very useful (Dhavalikar and Marathe 1974). Such a study will be of great help in distinguishing precisely the different cultural phases of the Ganga civilization. The early historical period is generally assigned to 600 BC - 300 AD or 600 AD, mainly on the basis of pottery, but it is forgotten that the NBPW does not occur after first century BC, and the Kushan pottery forms such as knife edge bowls and ink pot shaped lids begin to occur from the first century AD. Thus, much more can be gained by applying scientific techniques to the study of pottery. In this respect I can only cite the recent study of the Rouletted Ware of the early centuries of the Christian era on which, scientific analysis, has been proved to be indigenous to the eastern Ganga valley and not a Mediterranean import (Gogte 1997).

The different phases of the evolution of the Ganga civilization can be distinguished also on the basis of evidence of terracotta figurines (Dhavalikar 1999: 69-71) and brick sizes as been done at Mathura (Joshi 1989).

Geographical Paradigm

Settlement pattern studies constitute an important part of the geographical paradigm. Gordon Willey (1974) pioneered such studies and Clarke (1979) has shown how spatial analysis of the settlement data allows us to draw far reaching conclusions. The Ganga valley sites offer a very fertile field for such studies. Although minute statistical computations are lacking, save that by Makkan Lal (1984) and George Erdosy (1988), even the available raw data shows very clearly how the number of settlements were exponentially increasing in the earlier period from 600 BC - 300 AD, and how it went on decreasing in the post-Kushan era from 300 AD. In the pre-NBPW phase there were just 46 sites in the Kanpur district, but the number doubled in the succeeding NBPW phase when many new settlements were established for the first time. The PGW settlements comprised only large and small villages displaying a two tier settlement pattern, but in the following NBPW phase we witness the emergence of a four tiered system with metropolitan centres like Pataliputra, towns and cities as also large and small villages besides camps and hamlets. Allchin (1993: 196 ff) compares them with Kautilya's categories viz. *sthaniya* (capital), *drona-mukha* (divisional headquarter), *karvakatika* (sub-divisional headquarter) and *sangrahana* (local centres).

The tremendous increase in the number of settlements implies considerable demographic growth. According to Allchin (*ibid.*), Pataliputra was the largest city – a metropolis – in South Asia, spread over an area of 2200 ha with a population of 2,70,000 souls. This fact is in keeping with the description by Megasthenes who states that the city was spread along the Ganga and covered an area of about 14 km long and 3 km wide, with a total circumference of 42 km. Allchin has also analysed the evidence for other towns, but it is necessary to collect data of spatial organization for a fuller study of the settlement pattern.

The maximum habitation took place in the Kushan period, so much, so that almost every historical site has Kushan occupation. But Pataliputra seems to have lost its eminence as a metropolis to Mathura which became the main centre of political activity. In the post-Kushan times degeneration set in and during 300-600 AD nearly half the settlements were deserted, and in the post-Gupta era habitation continued only at about 30% of the sites. This happened not only in the Ganga valley but was an all-India phenomenon. It was first noticed by R.S. Sharma (1987), following D.D. Kosambi, who argued that the decline was due to the rise of feudalism and over exploitation of resources, but it seems that even the feudalism itself was the consequence of the drastic shift in climate toward aridity (Dhavalikar 2002). This again was the situation all over the Old World, as even in Europe the period from the 4th-10th century AD is described as "Dark Age".

Anthropological Paradigm

The anthropological paradigm consists mainly socio-economic archaeology. It may be argued that we have such a vast wealth of literature dealing with the social organization of the early historical period that archaeology may not be of much help. But it is necessary to realize that the literary data may not always be reliable and needs to be corroborated by concrete proof. There is little doubt that the distinguishing feature of the Hindu society is the Varna system, the antiquity of which goes to the Vedic times (*RV* X, 90, 12), but it has not yet been noticed in the archaeological record. This, however, is possible and in this respect the most remarkable site is that of Vaishali, the capital of the Lichchhavis (Deva and Mishra 1961). It is a very extensive town site which, as described in ancient literature, was divided into three sectors, one each for brahmins, kshatriyas and vaishyas. Interestingly, these different localities can be identified viz. Raja Vishal-Ka-Garh, probably for the royalty and kshatriyas; Kundagrama (Basokund) may be for brahmins; Vanijya-grama obviously for vaishyas; and there is the fourth locality too known as Koluha. It is thus an ideal site for testing the hypothesis that the different localities were occupied by the people belonging to different *varnas*, and large scale excavation may reveal the cultural differences such as house types, objects of daily use, dietary habits and so on, and even within a particular locality it will be possible to study the economic conditions of the occupants. In this context it may be recalled that Varaha-mihira (*Brihat-samhita* LIII, 70, 91; LXXI, 4) too allots four different quarters of a city to the four different *varnas* and Hieun Tsang has corroborated it (Watters 1904-05: I, 168). This micro-settlement pattern recalls to the mind that in Harappan cities which were divided into four localities as at Dholavira (Bisht 1991) and Kalibangan (Lal 1997: 118 ff). Incidentally it may be mentioned that such a study was successfully carried out at Altyn Depe in central Asia (Masson 1988).

There is abundant literary data which sheds a welcome light on the economic organization of the early historic period. Trade initially began with west and central Asia, albeit on a small scale, and became very brisk in the early centuries of the Christian era. This led to money economy with silver punched marked coins, for which the bar silver and cut silver from the bordering regions probably provided inspiration (Dhavalikar 1975). Growth of trade with Roman Empire was highly profitable and as a result, Roman gold coins started flowing into India. The Kushans too issued their gold coinage on Roman standard. The Guptas followed them, but from the time of Chandragupta II they ceased to be of pure gold, indicating strain on the royal treasury. The decline in trade from the fourth century was caused by the division of the Roman Empire and the Huna invasion of Europe. There is a paucity of coinage and many important dynasties of the Gupta and post-Gupta times did not issue coins. The conditions further deteriorated to such an extent that in the early medieval period cowries became a medium of exchange.

Agriculture, the mainstay of our economy, developed with spread of colonization in new areas, and received impetus when canal and well irrigation became available. Double cropping was practiced even by Chalcolithic farmers of the Ganga valley and the same continued in the early historical period when it was a flourishing occupation as is testified by the *grihapatis* who gave munificent donations to Buddhist establishments. But agriculture suffered from the fourth century probably because of the onset of aridity. From the sixth century onwards Nile levels were extremely low indicating failure of monsoon in India. Droughts became of frequent occurrence, some of prolonged duration of about twelve years which were known as Durgadevi famines. The *Markandeya Purana* (91: 43-44) described one lasting for hundred years when the goddess Durga assumed the form of Sakambhari and caused rain to fall and covered the earth with vegetation (Dhavalikar 1987). It may be stated that the Nile data is available for every year from 621 AD. It records extremely low levels indicating lack of floods, and suggests droughts in India (Quinn 1992).

This conclusion is not palatable for the simple reason that a very rosy picture of the Golden Age has generally been presented to us which is essentially based on literary evidence, but when it comes to hard facts, the truth becomes apparent. In Uttar Pradesh, Bihar and Bengal, the heartland of the Ganga civilization, the picture that emerges from archaeology is very disappointing. In Uttar Pradesh 56 sites were excavated between 1953 and 1995. Among these the early historic habitation was noticed at 48 sites during 600 BC - 300AD, but only 24 sites continued to be occupied during the Gupta period (300-600 AD), and at 11 sites in the post-Gupta times from 600-1000 AD. In Bihar the picture is more depressing; of the 25 excavated sites, 22 occupied in the Maurya-Sunga-Kushan period (600 BC - 300 AD), whereas only 9 continued to be inhabited in the Gupta era and only 4 revealed occupation in the post-Gupta times. The trend continues in Bengal too where of the 12 sites occupied during 600 BC - 300 AD, the habitation continued at 6 in the Gupta period, 5 in the post-Gupta, and 4 in the early medieval times. This was the situation of urban centres referred to in literature and inscriptions. But this hard evidence appears 'superficial' to some who prefer to rely more on literary testimony (Chakrabarti 2003: 131).

Surprisingly enough the miserable conditions reflected in the contemporary literature is corroborated by the eye witness accounts of foreign visitors. Hieun Tsang, the celebrated Chinese pilgrim who visited India from 629-645 AD and travelled over a large part of the country, has left a very interesting account of what he saw. His description reflects the general economic decline of the country. He found many towns in ruins, as for instance, Sravasti (Watters 1904-05: I, 377); even earlier Fa-Hien (393-441 AD) had also noted that much of the population had deserted the city, and there were only two hundred families (Legge 1965: 55). The same was the case of Kushinagar, the place of Buddha's *maha-pari-nirvana* (Legge 1965: 71; Watters 1904-05: II, 25). It is further corroborated by the excavations at Piprahwa which is identified as ancient Kushinagar (Srivastava 1996). Vaishali, once a prosperous city, the capital of a *Maha-janapada*, presented a desolate look; its gardens too had withered (Watters 1904-05: II, 631).

The situation has been justifiably identified as the Kali-yuga crisis of which there are descriptions in the contemporary literature.

What led to social disorder and *varna* conflict? Natural calamities such as famines, droughts and heavy rains cannot be ignored, but oppressive taxes also appear to have been an important factor. It is stated that, hit hard by famine and oppressive taxes, suffering people would migrate to prosperous countries in search of wheat and barley. Further, in the worthless, helpless and agitated world, where all distinctions had disappeared, tax oppressed people would seek shelter in the forests and mountains and live on vegetables, roots, meat, honey, fruits and seeds (Sharma 2001: 57).

The overall decline led to increasing pastoralism in the early medieval period which witnessed the emergence of pastoral deities in different parts of the country. In the Ganga valley the pastoral god *Bir Kunwar*, who was originally a hero (*vir*), is associated with Krishna, the pastoral divinity par excellence. That the Bir cult was quite widespread is evident from the saying "*Gaon gaon men Bir, gaon gaon men Thakur*". That marks the nadir of the Ganga civilization.

BIBLIOGRAPHY

Allchin, F.R. 1993. *The Archaeology of Early Historic South Asia: The Emergence of Cities and States.* Cambridge: Cambridge University Press.

Annual Report of Archeological Survey of India (ARASI) 1914-15: 69-71.

Binford, L.R. 1972. *An Archaeological Perspective.* New York: Seminar Press.

Bisht, R.S. 1991. Dholavira – A New Horizon of Indus Civilization. *Puratattva* 20: 71-82.

Chakrabarti, D.K. 1972-73. Concept of Urban Growth and the Indian Context. *Puratattva* 6: 27-32.

Chakrabarti, D.K. 2003. *Archaeology in the Third World: A History Modern Archaeology*. Delhi: Print World.

Clarke, David 1979. *Analytical Archaeologist – Collected Papers of David Clarke*. London: Academic Press.

Dhavalikar, M.K. 1975. The Beginning of Coinage in India. *World Archaeology* 6: 330-38.

Dhavalikar, M.K. 1987. Sakambhari – The Headless Divinity. *Annals of the Bhandarkar Oriental Research Institute* 68: 281-93.

Dhavalikar, M.K. 1999. *Historical Archaeology of India*. New Delhi: Books and Books.

Dhavalikar, M.K. 2002. *Environment and Culture: A Historical Perspective*. Pune: Bhandarkar Oriental Research Institute.

Dhavalikar, M.K. and A.R. Marathe 1974. Jorwe Pottery: A Statistical Study. *Bulletin of Deccan College Research Istitute (BDCRI)* 38: 17-22.

Erdosy, George 1993. City States of North India and Pakistan at the time of Buddha. In *The Archaeology of Early Historic South Asia: The Emergence of Cities and States*. F.R. Allchin (ed.): 99-122. Cambridge: Cambridge University Press.

Erdosy, G. 1988. *Urbanization in Early Historic India*. Oxford: Oxford University Press.

Gogte, V.D. 1997. The Chandraketugarh-Tamluk Region of Bengal – Source of Early Historic Rouletted Ware from India and Southeast Asia. *Man and Environment* 22: 69-85.

Gupta, S.P. 1974. Two Urbanizations of India – A Site Study in Their Social Structure. *Puratattva* 7: 53-60.

Hodder, Ian 2002. Archaeological Theory. In *Archaeology – The Widening Debate*. Barry Cunliffe (ed.): 77-90. London: Oxford University Press.

Joshi, M.C. 1974. Early Historical Urban Growth in India – Some Observations. *Puratattva* 7: 90-91.

Joshi, M.C. 1989. Mathura as an Ancient Settlement. In *Mathura: The Cultural Heritage*. Doris Srinivasan (ed.): 165-70. New Delhi: American Institute of Indian Studies.

Krishna Deva and V. Mishra 1961. *Vaishali Excavations*. Vaishali: Vaishali Sangh.

Lal, B.B. 1993. *Excavations at Sringaverapura* 1977-86. New Delhi: Archaeological Survey of India.

Lal, B.B. 1997. *The Earliest Civilization of South Asia*. New Delhi: Aryan Books International.

Lal, Makkhan 1984. *Settlement History and Rise of Civilization in the Ganga-Yamuna Doab (from 1500 BC – 300 AD)*. Delhi: B.R. Publishing Corporation.

Legge, J. 1965. *A Record of the Buddhist Kingdoms (Being an Account by the Chinese Monk Fa-Hien of his travels in India and Ceylon (AD 399-414)*. New York: Dover.

Masson, V.M. 1988. *Altyn Depe*. (Tr. by H. Michaels). Philadelphia: University Museum of Pennsylvania.

Mate, M.S. 1969-70. Early Historic Fortifications in the Ganga Valley. *Puratattva* 3: 58-69.

Quinn, W.N. 1992. A Study of Southern Oscillation related Climatic Activity for 622-1900 incorporating Nile River Flood Data. In *El-Nino: Historical and Palaeo-climatic Aspects of the Southern Oscillation*. H.F. Diaz and Vera Markgraf (eds.): 119-149. Cambridge: Cambridge University Press.

Sharma, R.S. 1982. The Kali Age: A Period of Social Crisis. In *India: History and Thought*. Essays in Honour of A.L. Basham. S.N. Mukherjee (ed.): 186-203. Calcutta: Subarnarekha.

Sharma, R.S. 1987. *Urban Decay*. New Delhi: Munshiram Manoharlal.

Sinha, K.K. 1969. The Northern Black Polished Ware: Fresh Hypothesis in the Light of Sravasti Evidence. In *Potteries in Ancient India*. B.P. Sinha (ed.): 174-184. Patna: A.I.H. & Archaeology, Patna University.

Srivastava, K.M. 1996. *Excavations at Piprahwa and Ganwaria*. Memoir of the Archaeological Survey of India 96. New Delhi: Archaeological Survey of India

Taylor, Walter 1948. *A Study of Archaeology*. Carbondale: Southern Illinois University Press.

Tewari, R., R.K. Srivastava, K.S. Saraswat and K.K. Singh 1999-2000. Excavation at Malhar 1999: Preliminary Report, District Chandauli (U.P.) *Pragdhara* 10: 69-98.

Tewari, Rakesh, R.K. Srivastava, K.K. Singh, K.S. Saraswat and I.B. Singh 2002-2003. Preliminary Report on the Excavations at Lahuradeva, District Sant Kabir Nagar, U.P. 2001-2002: Wider Archaeological Implications. *Pragdhara* 13: 37-68.

Walker, Gilbert 1986. *Long Range Forecasting of Monsoon Rainfall – Collected Papers of Sir Gilbert Walker*. New Delhi: Indian Meteorological Society.

Willey, Gordon R. 1974. The Viru Valley Settlement Pattern Study. In *Archaeological Researches in Retrospect*. Gordon R. Willey (ed.): 149-176. Cambridge: Mass.

Watters, Thomas 1904-05. *On Yuan Chwang's Travels in India*. Vol. I & II. London: Royal Asiatic Society.

VIBHA TRIPATHI

Archaeology of the Ganga Plain: Need for a Paradigm Shift

'The Ganges Civilization', at par with the Indus Valley Civilization is a term originally used by Sir Mortimer Wheeler (1959). It proved almost prophetic. The plains watered by river Ganga and her tributaries not only attracted man on their banks right from the Neolithic stage since the early farming stage but sustained human civilization to great heights. It is because of this that river Ganga has been revered by masses of India as a holy river, as the Mother that has nurtured life through the Ages. It is here that the first cities evolved after the decline of the Indus cities; it is in these fertile alluvial plains that the *Janapadas* or small settlements grew to the status of *Mahajanapadas*, the states and the home to the first Imperial Power of India. It became the cradle of Indian culture, a seat not only of power and polity but also of religion, philosophy, learning, science, technology, arts, literature, aesthetics, etc. The region has naturally engaged attention of scholars including the archaeologists and historians making deep inquiries in diverse fields of their choice. The vast expanse of the Gangetic Plain has been the main focus of archaeological excavations/explorations for several decades. Extensive archaeological investigations are being carried out here from much before the independence of India.

Government organizations as well as large number of educational institutions have been engaged in conducting excavations and explorations and producing research articles, books and journals on different dimensions of human culture flourishing in the hospitable ambience of the land. Decades of such researches have resulted into huge mass of archaeological data. As a result, we have come a long way since the fifties and sixties of the previous century. The so called Dark Age of Indian archaeology that posed problem for scholars earlier has nearly been filled up and is no longer relevant to us. We now know the cultural sequence fairly well. We also know to a fair degree of certainty about the nature of each culture that occupied the plains for several thousands years. The inter-regional relations may be perceived through the available archaeological remains. However, with ever increasing information several older perceptions about the culture need to be reviewed and older theories have to be revised. To cite an example, with availability of large number of radiocarbon dates from the sites of the region, the earlier chronologies need to be revised. We have come across evidence of cultivation of plants going back to 7th millennium BC. Equally importantly, the antiquity of cultures like the NBPW is constantly being pushed down. Additionally, there is also strong case of presence of Harappans in the region. Recently, we found a new evidence of Copper Hoard – Harappan interaction. Likewise, use of satellite data, now provides deeper insights into settlement pattern of cultures. Theories like diffusion or evolution of cultural traits and components need to be re-examined in light of new evidences. The processes of culture change and the developmental stages and/or transformation or transition from one cultural stage to another reflected in the material milieu are under scanner. Our knowledge about the dynamics of cultural exchange and interaction with the neighbouring cultural zones is yet to be fully spelled out in light of newer evidence. Thus despite the tireless efforts of scholars over last several decades, we are far from the target of a systematic understanding of cultural processes that flowed through the currents of the river Ganga and its tributaries. Therefore, we need to devise new methodology and fresh paradigms to study cultures of the Ganga Plain in light of newer evidence. A National Seminar was organized under the aegis of Banaras Hindu University to initiate a serious debate to devise new paradigms for interpretation of data available to us and to decide the future course of study of the archaeology of the Ganga Plain. The present paper seeks to raise some recent issues related to the archaeology of the region. It is proposed here to underline some new evidences that call for urgent attention of scholars. Before we attempt that, a brief outline of the ecological background of the Ganga Plain will be apt.

1. The Geographical and Ecological Background and Rise of Culture in the Ganga Plain

The Gangetic plain is thick fertile alluvium. It stretches over an area of approximately 1050 km. Bordered by Himalayan ranges in the north and Vindhya-Kaimur ranges in the south, it has varying ecosystems. A thick network of rivers like Ganga, Yamuna, Ghaghara, Gomati, Gandak, Son, Ken, Betwa, Chambal, etc. along with myriad of their tributaries irrigate this long span of land mass. Most of these rivers have their source in the higher Himalayas, while others take birth in the hills like Vindhyan and Kaimur ranges irrigating the central Ganga plain. The water bodies flowing through the plain give it a rich fertile alluvial soil. The bordering plains have a sedimental mantle of about 1800 m. It houses variety of minerals, many of them washed down from the hills.

These are extremely valuable for growth of culture in the region. One may say that there exists a perfect symbiosis between the hills and the plains, which is well evidenced in the material remains of ancient cultures. Because of such geographical relationship, there was an easy movement between the hilly zones and the plains from an early age. This may be easily discerned by a similarity in cultural remains like the pottery of these two zones.

There are subtle difference in the landform, soil and the main crops in different parts of the Ganga Plain, therefore, scholars divide the region into three major geographical divisions namely, upper, middle and lower Ganga Plain.

The Upper Gangetic Plain has the maximum length of 550 km from the east to the west and is about 380 km wide. The Allahabad-Faizabad tract is the dividing line between the upper and the middle Ganga plains. Climatically, it is a sub-humid zone. It is comparatively drier and more arid than its more easterly parts. Wheat and rice are the main crops growing in this part of the plain. Parts of Punjab, Rajasthan, Haryana and western Uttar Pradesh may be included in this region. The weather here is divisible into four seasons as in most of the plains of India. The climate tends to be relatively more prone to extremes, comparatively speaking. Winters could be frosty, especially in January with hailstorms up to February (which damages sugarcane and other crops of the season). The temperature at times drops down to 6-7 degree centigrade and goes up to 45^0 centigrade during May-June in summers when rains start cooling the scorching heat of summers. The annual rainfall varies from 50 cm to 140 cm with an uneven spatial distribution. The area around Agra and Mathura has only 25 inches of rainfall while the north and east gets approximately 50 inches of annual rainfall.

The soil is by and large homogenous throughout the upper Gangetic plain with *Usar* and *Bhabar* being the two types of soils, depending on the drainage pattern of the particular area. *Khadar* and *Bhangar* are other soils having a variety of local names. *Khadar* is a soil with rich nutrients found in the flood plains of rivers generally having a ph value of 6-8.

Ganga and Yamuna are the major rivers with tributaries like Ghaghara and Gomati. A host of streams rising out of Siwaliks irrigate the western part of the plain. On the eastern side, there are Kalinandi, Sukantha, Hindon, etc. Most of the rivers are perennial, providing a hospitable land for human occupation. Such hospitable conditions also make it one of the most densely cultivated parts of the country. In ancient days, thick vegetal cover, especially with moist deciduous forests must have covered the land. The plains are man-made, coming up as a result of constant deforestation. According to ancient literary sources, the area between Saraswati and Sadanira was covered with thick forests like Basundha, Naimisaranya and Utpalaranya, each associated with anecdotes related to different mythical contexts. *Sal, Babool, Khair, Shisham, Semal*, etc. are the trees growing there. Many of these, along with several other plant remains, have been testified from excavations at Atranjikhera, Lal Quila, Jakhera, Hastinapur, etc.

Through the centuries man has preferred these fertile tracts compared to areas with lower fertility. The fact is borne out in archaeological remains. In-depth settlement studies taken up in Kanpur district in Uttar Pradesh and Haryana (Makkhan Lal 1984, Brahemdutt 1980: 166) reveal that alluvial (*Bhangar*) land was densely populated. In Haryana, out of 258 sites of PGW, 155 are located on alluvial land. In Kanpur also, the Ganga-Rind Doab is far more extensively colonized than the Yamuna-Rind Doab.

The Middle Gangetic Plain has the maximum length of approximately 600 km from the east to the west and the width of about 330 km. Stamp (1959: 316-326) has drawn the boundaries between upper and middle Gangetic Plains on the basis of crops. According to him, rice becomes more prominent in this region as compared to wheat and barley, the primary crops of the sub-humid upper Ganga Plain. This area was once covered with thick forests.

There is a distinction in housing scheme too. Stamp observed that instead of tiled roofs of the east, wattle-and-daub mud houses are more commonly found in the middle Ganga plain; that area is demarcated along 100 cm isohyets. Stamp's demarcation line has been accepted by Spate (1967: 351-354) but this line of middle and upper Ganga plain is vaguely described as a line running roughly from Ganga-Yamuna confluence at Allahabad across N-NW to S-SE section of the Ganga. The middle and upper Ganga plain covers the states of Uttar Pradesh and Bihar lying on either side of the Ganga and Saryu (Ghaghara) within the Himalayas and Peninsular ramparts on the north and south, respectively. This region has been an area of intense socio-political activity through the millennia, and particularly during the first millennium BC primarily because of its hospitable nature. It has a favourable climatic condition with a good rainfall ranging from 170 cm to 90 cm per annum. The rain is heavier on the eastern side than on the western. It also gets good rains during winters. It is because of the good rainfall that this area is more densely populated compared to the lower rainfall zones of the plains. This region has a broad alluvial soil cover, divisible into *Khadar* and *Bhangar*. The *Khadar* land is closer to flood plains of rivers that get replenished during the annual floods. Generally, it is silty. But rivers like Ghaghara, Gandak and Son have more sandy beds. *Bhangar* is the older alluvium and covers the upland tracts beyond the flood limits. There are patches of *Usar* land in these areas. The soil grades from sandy to clayey loam. In parts the composition is too clayey and, therefore, impervious. It is richer in lime content and *Kankar* and more suitable for rice cultivation, as it holds water. The *Terai* region, with a narrow strip, is a pebbly *Bhabar* zone, exceedingly good for the rice cultivation. The middle Ganga Plain appears to have a special significance in the cultural make up. The adjacent hilly tracts were occupied right from the Stone Age. Recent excavations have reinforced evidence of early farming, especially of rice cultivation dating back to 7th-6th millennium BC or even earlier. A continued cultural activity is discernable in the region for thousands of years without any cultural break that culminated into rise of *Mahajanapadas*.

The Lower Gangetic Plain is an extension of the middle Gangetic plain with a greater humidity level. The rainfall here is around 170 cm and above. The soil is rich *Bhangar*, suitable for rice cultivation. Part of this plain has a coastal climate and vegetation. Ecological conditions invariably transform human behaviour and the cultural environment harmonizes with it. The specificities of cultural norms are reflected in material remains found in each zone defined above. Culturally also, as will become apparent in course of the discussion below, the Gangetic plains may not be treated as one homogeneous entity. There was a strong regional overtone in the cultural make up of the plains, more so at the earlier levels.

The geographical features briefly discussed above, help in visualize the background of the culture that prospered in the region. We now propose to examine certain cultural issues that have assumed greater significance in recent years due to recent archaeological evidence.

2. An Early Beginning of Agriculture in the Ganga Plain

It was assumed till recently that rice cultivation started in China from where it spread to other parts of the Asian continent. But the situation seems to be changing now. We know that there are sites yielding potsherds impressed with paddy husk in the late phase of Mesolithic period. There are Stone Age cultures, right from the Early Stone Age through the Mesolithic and Neolithic periods occupying the hills that bordered the Gangetic plain. With increasing interest in cultivation of plants and animal husbandry man seem to have stared moving towards the more hospitable, fertile alluvial land. The movement of culture is testified by the camp sites in the neighbourhood of the plains in the lower parts of the Vindhya-Kaimur and Siwaliks in the middle Ganga plain from Allahabad to Sant Kabir Nagar. Several sites have been exposed in Pratapgarh, Sultanpur, Mirzapur, Sonbhadra, Sant Ravidas Nagar (Bhadohi) up to Sant Kabir Nagar (Basti) districts. We find Neolithic settlements on the foothills close to small rivers or rivulets, such as Koldihwa, Mahagara, etc. There appears to be further shift of population towards the plains as far away as the Saryupar region as revealed by decades of excavations in this region (Singh 1993, 1994; Tewari 2003; Pal 1986).

It is quite likely that domestication of plants started in the hilly zones in places wherever ecological environment was suitable. An evolution of plants and cereals from wild to domesticated variety may easily be traced here. Saraswat's comments in this connection are quite revealing, indicating that the beginning of cultivation must be much earlier than hitherto believed, "It is no longer doubted that even the wild looking varieties may have been under cultivation as even at incipient phase, the plant remains wild for quite a long period of time in all the morphological and behavioural contexts. It is difficult to estimate how much time the wild cereal takes to mark the change from wild to cultivated one in their morphological characteristics discernible in the grains. There is reason to believe that what has been stated as wild may be an outcome of cultivation" (Saraswat, personal communication).

Mesolithic sites have been excavated in the valleys of Belan, Adwa, Son, Rihand, Paisuni, etc. (Pal 1986). There are also camp sites occupied during seasonal migrations on the ox-bow lakes in Pratapgarh, Allahabad, Sultanpur and Jaunpur districts. Excavations at Chopani-Mando, Sarai Nahar Rai, Damdama, Mahdaha, Koldihwa-Mahagara, Kunjhun, Tokwa, Panchoh, Jhunsi, Hetapatti, etc. have yielded settlements belonging the Mesolithic and Neolithic cultures.

Domestication of animals is testified by cattle pen with hoof marks encircled with post holes at Mahagara in Belan valley. Though bones of wild animals were found in plenty in Mesolithic period domestication begins with Neolithic as clear with bones of sheep / goat, cattle and even *equus*.

Likewise, Chopani-Mando in Meja Tehsil situated barely three kilometer from Koldihwa and Mahagara yielded wild variety of rice in advanced Mesolithic proto-Neolithic stage. Neolithic culture at Koldihwa yields evidence of domestication of rice. With both wild and domesticated varieties of rice present at Koldihwa, there is a strong case to show a process of domestication, starting from Mesolithic and continuing into Neolithic. Comments of Misra (2007) in this regard are significant indeed. "The presence of wild rice, however, when viewed in the context of the presence of processing equipment and other traits of semi-sedentary settlements would suggest that rice, may be in its wild form was being gathered during this (proto-Neolithic) phase. The appearance of hand-made pottery in this stage at Chopani-Mando and all the excavated Neolithic sites, offers another linkage between the two. The first occurrence of the tranchet during the proto-Neolithic phase of Chopani-Mando on the one hand and its recurrence at Koldihwa Mahagara and Panchoh on the other would also suggest continuity between the proto-Neolithic and Neolithic. A transition from gathering of wild rice to its cultivation is clearly indicated."

Evidence of early farming reported above from Koldihwa and Mahagara on Belan in the Vindhyas is substantiated further recently by the sites of Lahuradeva (Sant Kabir Nagar) in the *Terai* region and Jhusi (Allahabad) in the middle Ganga Plain (Tables - 2, 8). At both these places beginning of agriculture has been assigned a great antiquity of eighth-seventh millennium BC. The uncalibrated ^{14}C dates from Koldihwa are 5440 BC and 4530 BC (Sharma 1980). A wild variety of rice (*oryza nivera*) as noted above has been found from Chopani-Mando (district Allahabad, also on river Belan). A coarse variety of red pottery, mostly handmade black-and-red ware and also a pottery with post-firing incised designs occur. Rice husk has been used as a degraissants in the pottery. It is now firmly established that a domesticated variety of rice was also there at this stage (Saraswat 2000). As noted earlier, at Koldihwa a wild variety of rice was noted in the pre-Neolithic horizon. In the succeeding Neolithic phase, both wild as well as domesticated varieties occur.

A raging controversy was generated by the early ^{14}C dates of 6th millennium BC (uncalibrated). This evidence is more or less replicated at the site of Lahuradeva. Here also a few grains of rice corresponding to *oryza sativa* have been noted. Wild species of rice comparable to *oryza sufipogon* have also been found. This wild form of rice is still grown in the region (Tewari *et al*. 2002-03). Besides rice, Lahuradeva also yields evidence of foxtail grass (*Setaria cf glauca*), it grows in wild state throughout the region. It is grown and also gathered in its wild form by local people for food.

Beginning of agriculture in other parts of the Saryupar plain has been studied closely by scholars working in the region (Singh 1994). By means of floatation the botanical remains were retrieved and examined from Narhan (Saraswat *et al.* 1994) from what has been termed the Narhan Culture (instead of Chalcolithic primarily due to absence of lithic tools). Early evidence of cereals has also been retrieved from pre-Narhan culture from sites like Imlidih Khurd on the bank of Kuvana, a tributary of Ghaghara. Period I is said to be an 'antecedent phase' of Narhan culture labeled as pre-Narhan. The diagnostic traits of this cultural phase are wattle-and-daub structures having ovens and hearths, silos or bins in circular huts. Floor with an average thickness of 25-30 cm was found in excavation. Other finds include micro beads of steatite, beads of terracotta, agate, faience, bone points and pottery discs. Animal bones have been recovered in sizeable number. Domesticated animals include cattle, sheep/goat, pig (?). Many have cut marks. Fresh water turtle and fish bones have also been found. Noteworthy feature is evidence of cultivation of two crops with rice, barley, wheat, *jawar* and other millets like *bajra* (pearl millet), pulses like lentil, field pea, grass pea (Khesari) green gram or *mung* and oil seed like *til* or sesame. Stones of jujube and *awala* have also been recovered.

The pottery of pre-Narhan phase is essentially crude, ill-fired red ware and a type with cord impression (corded ware) or plain red. Some vessels of red ware bear post firing incised designs like opposite triangles or appliqué designs.

The pre-Narhan cultural phase is followed by Narhan culture in Period II. NBPW period occurs in period III (having only a few pieces of NBPW). It is characterized by an absence of Black and Red Ware (BRW). Red ware and Black Slipped Ware (BSW) are the main ceramics at this stage.

Similar evidence has been unearthed from excavations at Bhunadih (on Bahera Nala in district Ballia). In period IA cord impressed red ware are found along with spouted vessels, beakers and vases. Straight sided beaker of red ware with short spout is a unique shape found here. Basins with flaring rim and groves on their outer surface and vessel with closing (narrowing) mouth are the main pottery forms. Micro-beads of steatite occur along with terracotta and pottery discs.

The next period IB is said to be an overlap phase of pre-Narhan and Narhan phases of culture with introduction of BRW and BSW. The main shapes are pedestalled bowl, dish-on-stand of BRW and *lota* shaped vessel of BSW having post firing scratching on the exterior and few painted sherds of red ware with dots and dashes painted on the surface. Beads of steatite, terracotta and semi-precious stones and pottery disc are found. Period II at the site is represented by Narhan culture. The main identifiable features being wattle and daub structures evidenced by mud clods with reed marks, beads of steatite, semi-precious stones, terracotta and pottery discs.

Excavations were carried out at several other sites, such as Dhuriapar and Waina. Vestiges of Chalcolithic culture of similar nature have been noted at several other sites explored in the Saryupar plain (Singh 1992, 1994, 1999).

So far as the beginning of agriculture, especially the cultivation of rice and millets is concerned, the north-central India and the middle Ganga plain have emerged as areas of great significance. K.S. Saraswat (2000) has identified several specimens of carbonized grains of cultivated variety of rice along with barley from the Mesolithic phase of Damdama (District Pratapgarh). The range of ^{14}C dates from the site is between 8th-7th millennium to 3rd millennium BC (see Table 1). Although the beginning of Neolithic generally goes back to 3rd millennium BC in the middle Ganga plain, the evidence at several sites noted above suggests a cultural continuity between Mesolithic and Neolithic phases and therefore, showing an earlier beginning. Sites like Jhunsi, Hetapatti, Tokwa, Kunjhun, Damdama deserve special mention in this regard.

Thus the transformation from wild variety of rice to its domesticated one was accomplished by 8th-7th millennium BC in the central Ganga region. Jhusi (Misra, 2007) has yielded ^{14}C dates of 5837 (BS 2524) and 6198 BC (BS 2525) (Table 2). On clibreation it comes to 7447BC (BS 2526). Tokwa (Misra *et al.* 2001) has yielded dates going back to 7th millennium BC from Neolithic levels with evidence of rice. Rice cultivation had become common in the plains in the middle Ganga plain. The site of Malhar (Tewari *et al.* 2000) located on the fringes of the Vindhyan hills in district Chandauli has also yielded grains of rice from a pit datable by ^{14}C denominations to 6380±110 BP (5329, 5323, 5262 cal BC) It has even travelled further towards the Terai region as indicated by the evidence of Lahuradeva yielding AMS date of 7th millennium BC (Tewari *et al.*, *op. cit.*). Thus the middle Ganga plain emerges as the key zone wherein the wild variety of rice evolved to its domesticated species (*Oryza sativa*). Cord impressed pottery, a diagnostic trait of Vindhyan Neolithic culture that was first noted at Koldihwa-Mahagara has been found at most of the sites in the lower levels at sites in Himalayan *Terai* region in the mid Ganga plain is significant indeed. There appears to be an interaction between the Vindhyan Neolithic and the cultures in the plains. The pre-Narhan culture provides an undeniable evidence of migration/interaction between the plains and the hilly zones.

A thorough examination of available archaeological evidence including the recent radiocarbon and AMS dates leads to the conclusion Misra (2007, *op. cit.*) about "… existence of two regional centres for the beginning of agricultures in the Indian sub-continent. One centre was developing in the north-west with barley and wheat as major crops; the other was developing in the north-central India and the middle Ganga Plain with rice and small millet as main cereals."

2.1. *The Neolithic – Chalcolithic Continuum: Cultural Evolution*

A cultural continuity is discernible by overlapping phases of Neolithic-Chalcolithic cultures that succeeded it at a number of sites like Senuwar (District Rohtas, Singh 2004) in the middle

Ganga plain. At most of the other sites, Neolithic is succeeded by Chalcolithic period without any break (Table 3). Several clusters of Chalcolithic sites with Neolithic antecedents have been located in the Vindhya-Kaimur belt in Uttar Pradesh-Bihar. Mention may be made of Koldihwa-Kakoria group of sites, Raja Nal-ka-Tila (District Sonbhadra) and Malhar on Karamnasa river in Chakia Tehsil of Chandauli district near Varanasi. The distance between the last two sites, as the crow flies is only about 40 km (Tewari 2004). Further north-east there are sites like Chirand (District Saran) on river Ghaghara (*IAR* 1962-63: 6-7; 1963-64: 6-8) Taradih, Chechar Kutubpur and Senuwar (B.P. Singh 2004). The cord impressed pottery of the Vindhyas and the burnished and grey ware occurs there in the Chalcolithic period showing an inter-regional contact facilitated by the ecological setting of the region. The Neolithic-Chalcolithic sites in the eastern Uttar Pradesh and neighbouring Bihar are generally located at the foothills and close to the arable land watered by minor rivers or streams. Interestingly, the Neolithic-Chalcolithic settlements closer to rivers seem to flourish better than the sites located on the foothills for obvious reason, *i.e.*, availability of better land for cultivation and perennial source of water. Senuwar (District Rohtas, Bihar) on river Kudra is an example in the case. The site remained in occupation without any break from the Neolithic to Kushan period. Period I at Senuwar has been divided into sub-phases IA (Neolithic) and IB (Neolithic-Chalcolithic overlap). Period II is Chalcolithic in nature. Period III and IV belong to NBPW and Kushan periods, respectively.

The Neolithic pottery at Senuwar is represented both by handmade and wheel made red ware. Burnished red ware, burnished grey ware, rusticated ware and different types of corded ware have formed the pottery repertoire of this period. The corded ware with vertical, oblique or slanting strokes is a diagnostic trait of Vindhyan Neolithic culture of Koldihwa and Mahagara. Microliths made with chert, chalcedony, agate, quartz and quartzite, triangular ground celts generally of basalt have been recovered. A large variety of stone objects like pestle, saddle, quern, rubber stone, disc, hammer stones, etc. occur commonly. Beads in both finished and unfinished state also occur. Bone tools with use mark have been found. Of great interest is occurrence of rice (*Oryza sativa*), barley (*Horendum vulgare*), field pea (*Pisum sativum vararvense*) and lentil (*Lens culinaris*) along with other varieties of millets.

In the upper layer new cereal remains such as dwarf wheat (*Triticum-sphaerococcum*), grass pea (*Lathyrus sativus*), *Kodon* millet (*Paspolum serobiculatum*) and the seeds of vetch (*Vices sativa*) (that grows as a weed with winter crops) were also found. Interestingly, the variety of rice (*Oryza sativa*) found at Koldihwa-Mahagara and the one at Senuwar are the same. One can easily deduct on the basis of similarities in pottery, tool typology and cereal remains that there was an obvious contact or perhaps a culture shift from the hills towards the plains.

There is a cultural continuity between the Neolithic and the subsequent phase (Pd. IB) of the Chalcolithic culture. In this sub-period there is a qualitative improvement in ceramic industry, especially in the surface treatment. The quality of burnishing improves the appearance of red

147624

and grey wares giving them a good shining surface. Variation is also noted in the cord impressed ware. There is an interesting feature of post firing painting with ochrous pigment. Number of such specimens increase in the Chalcolithic phase. Simple black bands on the rim or such linear patterns were generally executed, especially on the shoulder portion that is luted. Such features are also noted at Chirand in the Neolithic phase. Handmade bull figurines have been found both at Chirand and Senuwar. Besides, there are similarities in stone, bone and terracotta objects recovered from these levels.

Thus a clear cut cultural zone emerges, showing an early beginning of settled life, domestication of plants and animals in the Vindhya-Kaimur region running up to the foothills of the Himalayas. There is a great antiquity of cultivation of cereals in the Saryupar plains as evidenced at Lahuradeva as noted earlier. It may be construed on the basis of such evidences that interactions between the two zones - the hilly tract and the adjacent plains started with beginning of domestication of plants. There was a gradual shift from the hills towards the plains. And this process as the evidence stands today had started much earlier than hitherto believed.

In light of similarities in the cultural components like ceramic tradition, beads including the steatite beads, farming of variety of grains including cultivation of rice and new chronological frame work, there is need for a fresh evaluation of the history of agriculture going back to 7th millennium BC. Equally interesting is the migratory pattern within this culture zone. One can look at the Mesolithic cultures in the nearby hills bordering the plains for inspirations that are reflected in material remains of the Neolithic and closely followed by the Chalcolithic cultures in the plain. The Chalcolithic culture of this region develops its own personality that is a manifestation of human capability towards adaptation to ecological constraints. The upper Gangetic plain, as noted earlier has a slightly different ecosystem. It is relatively more arid. The cultures of the region of the upper Ganga plain have distinct characteristic features as reflected in the OCP and PGW cultures. Recent discoveries have thrown new light on cultural pattern of the upper Ganga plain including intrusion of Harappans towards this region.

3. The Interactions Between Cultures of the Ganga Plain and the Incoming Harappans

The Harappan foot prints in the Ganga Plain are much more pronounced today than ever before. The upper Ganga Plain was occupied by the OCP ware culture 3rd-2nd millennium BC. Whether the two ever came into contact could never be ascertained through excavations.

The excavations at Alamgirpur (*IAR* 1958-59) in early sixties had provided a definite evidence of the Harappan presence in the Yamuna-Hindon Doab. The Late Harappan culture flourished in Harayana. At Bhagwanpura (Joshi 1993) an overlap between the Harappan and PGW phases has been brought forth, suggesting a direct interaction of the Harappans with the Doab cultures. Yamuna that enters the western Uttar Pradesh taking a more westerly course must have facilitated Harappan migrations towards the Doab region. The Harappan expansion towards the upper

147624

Gangetic plain and their interaction with the local culture is now a well established fact. The recent excavations at Sanauli in Baghpat district reveals copper hoard implements in the Harappan graves. This not only buttresses such assumption but also corroborates a meeting of the two traditions. We may now have to look at material evidence of such interactions.

Most of the places in upper Ganga Plain yielded both Copper Hoard and OCP on excavations; hence an OCP-Copper-Hoard connection has been suggested. In 1971-72 excavations at Saipai (Wahal 1971-72: 12-13) yielded two Copper Hoard objects – a hooked spearhead in trial digging and a harpoon during the regular excavation. It is therefore, generally assumed that the Copper-Hoards were the handiwork of the OCP culture.

A close study of the OCP shows a strong regional variation. Dikshit who has excavated several OCP sites and studied the culture closely observes that the upper Doab has revealed two groups of sites. "There are certain settlements where Harappans were found living with OCP users, whereas there are also sites, which are absolutely free from any Harappan admixture except for some typological similarity in pottery. They do not yield anything Harappan as such" (Dikshit 1979: 295). This observation reinforces the hypothesis of some kind of a contact of the OCP-Copper-Hoard people with the Harappans. It has now been confirmed, as noted above by the recent excavations at Sanauli in Baghpat district near Meerut.

The Copper-Hoard tool-types are heavy, blunt and thick in appearance. Celts weighing about 2-4 kg are the most common object found in the hoards. The other copper tool-types are harpoons, swords with antennae, rings, and anthropomorphic figures. The hoards weigh 30-40 kg at times and are invariably found buried. What was the function of these objects? Why have these hoards always been found buried underground keeping them safely in catches? These questions are important to proper understanding of Copper Hoard and their cultural context.

The Copper-Hoard objects have a purity of 98 percent (copper). Arsenic is present as an impurity. The purity may be attributed to the nature of ore that was used. Traces of iron have also been noted in a few samples The source of copper has been said to be Singhbum copper mines (Agrawal 1971, 2000: 119-120; Bhardwaj 1979). In view of Agrawal "…about 50% of the artifacts analysed so far show a significant arsenic content (1-7 percent), but no tin whatsoever (Agrawal 1982). Whether arsenic was deliberately added for increasing the hardness of the metal artifacts, or it was an impurity present in the metal used, is difficult to say. As arsenic minerals are rare in India even today, deliberate addition of arsenic seems to be rather a remote possibility. There are several unresolved issues related to the Copper Hoards – technique of manufacturing utilization pattern dispersal and distribution mechanism, etc.

Paul Yule who has done an extensive work on the Copper Hoards, classifying and analyzing the objects from different regions. (Yule 1985: 103-14, 1989) is of the opinion that most of the heavy copper objects of these hoards do not seem to have been used as tools or implements. One may wonder as to what was the need for fashioning such heavy copper objects and hoarding these? "An interpretation for these often irregularly shaped objects as ingots find numerous parallels outside of India. Even the double axe with blunt edges could not have a straight functional use; neither do the bar-celts without use mark suggest this. If they are ingots we suggest that they belong to a much later period than generally assumed…". Such doubts about the Copper Hoards being late has been dispelled with the recent evidence of their presence in the Harappan graves at Sanauli (Baghpat district). This also leads to the assumption that the two were in contact for some reason that are not far to seek. One of the plausible causes of such a relationship could be transactions in copper. The users of Copper Hoard seem to have traded these objects. At least some of these so called implements were ingots. The late Harappans of Haryana-western Uttar Pradesh seem to have procured copper from the former. A prolonged contact of the two communities did partake of some influence on the OCP pottery types as suggested by Dikshit, above.

The nature of OCP settlements is not very uniform either. Some of the settlements are flimsy and are transitory in nature while several others look somewhat more permanent with better material remains. We may reflect on this issue a little later. It is now believed that the Copper Hoards are the objects of the OCP people. Another much detailed question related to Copper Hoards is the source of copper. Which was the area tapped by the Copper Hoard artisans? These questions require a serious consideration at this juncture. The copper mines of Manladib, Rakha and Mosabani in Singhbhum could have been believed to be exploited (Agrawal 1971, Bhardwaj 1979). In the south-eastern zone, of Copper Hoards flat celts, shouldered celts, bar-celts and double edged celts are the main types that occur. For the cultures of upper Ganga region in view of Agrawal the Kumaun copper ore deposits were the likely source. A large number of mining and smelting sites have been located in Uttarakhand in central Himalayas (Agrawal and Kharakwal 1998). Recent findings of Copper Hoard at Abhaipur in Pilibhit (Mishra and Arora 2005-06; Mishra in present volume) on the bank of river Dehua or Garra that has its source in Kumaon hills is interesting in this regard. One may easily trace the communication line between the two regions.

Lal in his meticulous examination of Copper-Hoards pointed to an affinity between the stone bar-celts used by the ethnic communities like Ban Ashuria of Chhota Nagpur area and the bar-celts found in Copper Hoards (Lal 1951: 20). This similarity has special significance. In several parts of India such itinerant craft specialist societies are still living in the mineral rich zones. They tap these deposits for production of goods/ingots for living. It is not unlikely that their ancestors were itinerant traders like the Gadulia Lohars. Some kind of a transaction mechanism must have been worked out also in the antiquity. This also explains distribution of Copper Hoards from Orissa to Punjab.

Such an interaction is reinforced by similarity in pottery forms recovered from the excavations including the ones from Sanauli (Sharma *et al*. 2004). There are dish-on-stand, vases of elliptical shape with or without footed base, 'pot-stand', jar, *lota* vase, bowls, bowls-cum-lid, miniature vessels, etc. According to the excavator both pottery and the cultural assemblage show "definite affinity with the late Harappan sites in the region, on the one hand and with the OCP sites on the other". The excavations at Sanauli in the subsequent years (2005-06) have yielded gold objects, glass beads and copper objects including Copper Hoard implements like antennae sword from graves of Late Harappan period (Sharma *et al*. 2006).

4. An Early Emergence of Iron in the Ganga Plain

The early metal-smith devised a novel method for extraction of metallic iron in a semi-solid state known as bloomery process. It took a long period of trial and error to master the technique of producing bloomery iron. When, how and under what circumstances the iron technology developed has been studied closely (Tripathi 2001, 2008).

The first appearance of iron is in different contexts in different parts of the Ganga Plain. At a few sites such as Atranjikhera (Gaur 1983), Jakhera (Sahi 1994), Noh (Agrawala and Vijay Kumar 1976) thin cultural strata of black-and-red pottery precedes the PGW culture above the OCP deposit. In this cultural zone iron is introduced at this stage at sites like Noh. The earlier evidence of emergence of iron with PGW has to be modified with occurrence of bits of iron in pre-PGW culture at Noh (District Bharatpur in Rajasthan) and at proto-PGW cultural stage at Jakhera (District Etah). Both these sites are located close to the Agra-Gwalior belt of iron ore deposits. The dominant ceramic tradition at this stage is black-and-red (BRW) that continues to occur with PGW in the subsequent cultural period. Jakhera has yielded a red ware with stroke paintings in black. PGW has adopted the shapes like bowls and dishes of the BRW and added black painting on its grey surface. What is definite, however, is that iron comes to be used on a regular basis in this region at this stage.

The sites in the Vindhyan region like Koldihwa, Raja Nal-ka-Tila (Table 9) and Malhar (Table 10) have yielded early dates of iron. There are early ^{14}C dates like, 3550 ± 90 BP (1882 (1743) 1639 cal BC (see Tewari *et al*. 2004; Tables 4, 5, 7) from the iron bearing layers. There are three dates which consistently take back the antiquity of iron at Malhar to the opening centuries of the 2nd millennium BC. In the considered opinion of the excavator iron appears in period II in a developed form. "The artifacts recovered from layer (3) include sickle, plough share (?), nail, clamp, awl, spearhead, arrowhead and flat bar. It may be noted, however, that the lower levels of this layer have revealed nails, sickle (?) and unidentifiable objects, while other types appear in middle and upper levels. Knife, bangle/bracelet, chisel, *khurpi*, and sword (?) are found in layer no. (2) … one may convincingly surmise that immigrants indubitably hailed from some community of skilled iron-smiths established elsewhere. These artifacts may be classified broadly under the implement used in agriculture, craft, daily use and war, besides decoration" (Tewari *et al.* 2004: 26).

Early occurrence of iron has already been indicated from Ahar and Eran in a Chalcolithic set up. At these sites the common feature is a continuity between the Chalcolithic and the subsequent iron bearing levels. Mangalkot in Bengal is an exception where iron is found from the earliest level. There is hardly any change in the material culture except for a natural refinement in cultural components over the period. Introduction of iron, albeit in a small number is the most conspicuous factor in the otherwise Chalcolithic cultural context. Whether iron was introduced under some outside influence or it was an innovation of the copper using community that had been inhabiting the region for generations is a question that needs to be addressed in this connection.

A review of status of iron in the neighbouring countries bordering the Indian sub-continent reveals that the balance tilts more in favour of an independent development of iron metallurgy in India. Neither the tool-typology and the number of objects nor the context of occurrence of iron in the neighbouring countries suggest interactions strong enough to impart the metallurgical know how to metal smiths in the main land India. The dates from iron bearing levels in the heart land of India are now coming to be much earlier than on the border lands of Indian sub-continent. It has been construed after examining various dimensions of development in metallurgy that in the absence of sufficient availability of copper ore and inadequacy in technological skill, it is the Chalcolithic metal worker who is more likely to experiment with new material. Tylecote's (1962: 211) remarks in this context are apt, ".... invention of iron may be attributed to primitive copper smelters than to the more sophisticated ones." The statement appears truly applicable in the present context. After due consideration on the issue of emergence of iron in India (Tripathi 1986, 2001, 2008), the present author has arrived at the conclusion that iron metallurgy is indigenous in India.

The only question that we are still left with is – which is the area responsible for introduction of iron is India. Much more evidence is required to answer this question with certainty than available to us today. Suffice it to say that the Vindhya-Kaimur region on the one hand, the megalithic cultures of south India on the other have early evidence of use of iron, going back to middle of the second millennium BC. Likewise, more recently the evidence coming from megalithic Kashmir is also important in this regard. Gufkral has yielded dates of *circa* 1800 BC from megalithic burial with iron. At the present state of our knowledge we can say that the Gangetic plain emerges as one of the early centres of use of iron. However, we have yet to work out the logistics of iron utilization at different cultural stages and impact of iron technology on economic development. It may be agreed that use of iron on a large scale must have, in the longer run, decided the course of history of the region – making it more prosperous and giving rise to affluent centres as a result the *Janapadas* grew into *Mahajanapadas* over the period.

5. Early Urbanization of the Ganga Plain

While talking about the cultures of the Ganga Plain, we are now faced with set of new challenges posed by recent radiocarbon dates. We have discussed above the dates from iron yielding deposits from various sites. Instead of the first millennium BC, we have seen that the antiquity of iron has been now pushed to the first half of the 2nd millennium BC. The date for beginning of agriculture now goes back to 8th-7th millennium BC. The region emerges as one of the key centres for cultivation of rice not only in India but in the entire sub-continent. The fertility of soil, presence of perennial rivers transecting the plain, rich arable land provide an effective communication network. Equally important is availability of minerals and valuable ore deposits in the hills bordering the plains. These are contributory factors making the land an 'area of attraction' for growth of cultures after the Harappan hegemony comes to an end. It appears that the process started much earlier than hitherto assumed. The regional cultures of upper, middle and lower Ganga plains were overshadowed and taken over by an extensively distributed Northern Black Polished Ware (NBPW) culture. It has the distribution pattern like none of the antecedent cultures. The NBPW is found from Nepal to Sri Lanka, and from the present Bangladesh to Pakistan.

NBPW may indeed be called a harbinger of prosperity and politico-cultural growth in the sub-continent. It heralds urbanization to the Gangetic plain. There is intensification in structural activity that is of a more permanent nature. Defences, baked bricks, pottery drains, ring-wells, etc. gradually come to be used in structural design. Use of coinage and script start with the NBPW culture.

The pyrotechrinological skill itself reaches an all time high during this period. The metallic finish of NBPW is still an enigma for modern ceramic experts. It goes without saying that the manufacturers of NBPW had mastered the kilning-potting technique producing a pottery with such a shining surface in black, golden brown, blue, silver and gold colours that it has been compared with silver ware by archaeologists. It is worth underlining here that iron oxide had a key role to play in imparting the colour and shine to the surface of the NBPW. We see an interconnection between the kilning and furnace technology having a better control over temperature that was essential in iron manufacturing. Iron, though introduced much earlier comes of age only during this period. The technological skill is put to proper use in production sector leading to prosperity as reflected in material culture of this period.

Generally, NBPW and ensuing changes were dated roughly to *circa* 600-300 BC plus-minus hundred years on both ends. Recently the bracket has been further expanded by a couple of centuries. There are ^{14}C dates going back to pre-1000 BC (see Table 6). Does it mean that the antiquity of coinage, and writing which are associated with NBPW can be pushed back in time now? Does urbanization, another feature associated with this culture start earlier than thus far assumed? We might be forced to give a serious consideration to such cultural dimensions manifested is in the cultural dynamics of the Ganga plain in light of the recent evidences some of them highlighted here.

Conclusion: Need for a Paradigm Shift

Concluding the discussion, it may be said that the earlier stances on cultural development in the Ganga plain may have to be greatly modified in view of recent discoveries in the field of archaeology. We need to devise fresh paradigms to look at the cultures of the Ganga plain.

(1) The phenomenon of cultural evolution is clearly evidenced in an early beginning of agriculture, especially in rice cultivation. The food gathers of 'Advanced Mesolithic/proto-Neolithic' cultures of the north-central India started the process that took roots in the subsequent phase. We are in a position to suggest an independent zone of rice cultivation in 8th-7th millennium BC. There are camp sites showing seasonal migration near the horseshoe lakes. In the subsequent period with growing interest in cultivation people shifted towards the foothills and thence to the plains on a more permanent basis.

(2) There is a smooth transition from Neolithic to Chalcolithic. Subsequently, iron is introduced in the Chalcolithic milieu. But for the introduction of iron, not much change is perceptible. Iron appears to be a product of metallurgical innovations carried out by the metal workers of the regions. But why does it take so long to feel its impact on life and culture of people of the Plain? This question needs a deeper inquiry.

(3) The continuity in pottery form and other cultural commodities clearly manifests innovative spirit of the people. Inspirations from other corners cannot be ruled out. The Harappan wheat at Senuwar or the steatite micro-beads at sites in the Saryupar plains are pointers to this.

(4) The Harappans displaced from their 'homeland' were knocking at the doors of the 'Ganges Civilization'. There is now clear-cut evidence of (Late) Harappan – OCP/Copper Hoard relations.

(5) Equally important is the recent evidence demonstrating a strong presence of Harappans in the western Uttar Pradesh. A rich deposit of the Harappan jewellery accidentally discovered at Mandi deserves special attention as an instance in the case. It has legions to tell on the Harappan intrusion/migration towards this region. It is reinforced further by excavations at Sanauli in Baghpat district. Many of these contain Copper Hoard implements. The long debated issue of Copper Hoard – Harappan interface gets new dimensions with such a discovery.

These issues manifest a greater amount of inter zonal interactions within the Ganga plain. Natural evolution of cultural processes seems to have been at work from an early age. The innovative spirit, the adaptation pattern of behaviour are exhibited right from the Stone Age, be it in the field of agriculture, craft production, tool technology and in later cultures in metallurgy. Man's natural will to improve and improvise is greatly manifest. At the same time, inspirations –

overt or covert-seem to have been received every now and then. It is time that greater attention is paid to identify these.

(6) Chronology of cultures needs to be reviewed in light of recent radiocarbon dates – be it for Neolithic cultures (at Lahuradewa, Tokwa, Jhunsi) or iron bearing deposits (at Malhar, Nalka-Tila, Dadupur) or that of the NBPW culture at number of sites in the Ganga plain including 1200 BC date from Juafardih in Nalanda district (Saran *et al.* 2008). We can not brush aside these early dates. This has a serious repercussion on the antiquity of cultures of the region. The early date of NBPW cultures have a direct bearing on urban processes using coinage, writing, baked bricks and the associated development leading to economic affluence and socio-political changes. The urban centres mentioned in Buddhist and Jaina literature must have had deeper foundations than hitherto believed. Thus there is a greater need for a closer observation of material remains within a larger framework of cultural exchange and innovations. A fresh paradigm has to be worked out for understanding of the personality of cultures of the Ganga plain.

BIBLIOGRAPHY

Agrawal, D.P. 1971. *The Copper Bronze Age in India*. Delhi: Munshiram Manoharlal Publishers Pvt. Ltd.

Agrawal, D.P. 1982. The Indian Bronze Age Cultures and Their Metal Technology. In *Advances in World Archaeology*. F. Wendoof and A.F. Close (eds.): 213-264. New York: Academic Press.

Agrawal, D.P. 2000. *Ancient Metal Technology and Archaeology of South Asia*. Delhi: Aryan Books International.

Agrawal, D.P. and J.S. Kharakwal 1998. *Central Himalayas : An Archaeological Linguistic and Cultural Synthesis*. New Delhi: Aryan Books International.

Agrawala, R.C. and V. Kumar 1976. The Problems of PGW and Iron in North-Eastern Rajasthan. In *Mahabharat, Myth and Reality*. S.P. Gupta and K.S. Ramachandran (eds.): 241-244. Delhi: Agam Kala Prakashan.

Agrawala, R.C. and Vijay Kumar 1993. Ganeshwar-Jodhpura Culture: New Traits in Indian Archaeology. In *Harappan Civilization*. G.L. Possehl (ed.): 125-135. New Delhi: Oxford and IBH Publishing Company.

Bhardwaj, H.C. 1979. *Aspects of Ancient Indian Technology*. Varanasi: Motilal Banarasidass.

Brahemdutt 1980. *Settlements of Painted Grey Ware Culture in Haryana*. Ph.D. Thesis (Unpublished). Kurukshetra: Kurukshetra University.

Dikshit, K.N. 1979. The Ocher Coloured Ware Settlements in Ganga-Yamuna Doab. In *Essays in Indian Protohistory*. D.P. Agrawal and D.K. Chakrabarti (eds.): 285-299 New Delhi: B.R. Publishing Company.

Gaur, R.C. 1983. *Excavations at Atranjikhera.* Delhi: Munshiram Manoharlal.

Joshi, J.P. 1993. Excavations at Bhagwanpura (1975-76) and Other Explorations and Excavations 1975-81 in Haryana, Jammu-Kashmir and Punjab. *Memoirs of Archaeological Survey of India* No. 89. New Delhi: Archaeological Survey of India.

Lal, B.B. 1951. Further Copper Hoards from the Ganga Valley and a Review of the Problems. *Ancient India* 7: 20-39.

Lal, Makkhan 1984. *Settlement History and Rise of Civilization in the Ganga – Yamuna Doab from 1500 BC to 300 AD*. Delhi: B.R. Publishing Corporation.

Mishra, Anup (in press). Archaeological Investigations in Deoha River Valley with Special Reference to Excavations at Abhaipur, District Pilibhit, Uttar Pradesh. In *the present volume.*

Mishra, Anup and U.P. Arora 2005-06. Excavation at Abhaipur 2005-06, District Pilibhit, Uttar Pradesh. *Puratattva* 36: 76-84.

Misra, V.D., J.N. Pal, M.C. Gupta 2001. Excavations at Tokwa: A Neolithic-Chalcolithic Settlement. *Pragdhara* 11: 59-72.

Misra, V.D. 2007. Stone Age Cultures, their Chronology and Beginning of Agriculture in North-Central India. *Man and Environment* 32(1): 1-14.

Pal, J.N. 1986. *Archaeology of the Southern Uttar Pradesh*. Allahabad: Swabha Prakashan.

Sahi, M.D.N. 1994. *Aspects of Indian Archaeology*. Jaipur: Publication Scheme.

Saran, S.C., N.G. Nikoshey, S. Nayan, J.K. Tiwari, A. Arif and N. Saxena 2008. Excavation at Juafardih and its identification with Kulika. *Puratattva* 38: 59-73.

Saraswat, K.S. Personal Communication.

Saraswat, K.S., N.K. Sharma, D.C. Saini 1994. Plant Economy at Ancient Narhan (*ca.* 1300 BC to 300/400 AD). In *Excavations at Narhan 1984-89*. P. Singh (ed.): 255-346. Varanasi and New Delhi: Department of A.I.H.C. & Archaeology, Banaras Hindu University and B.R. Publishing Corporation.

Saraswat, K.S. 2000. Annual Report (1999-2000): 24-25. Lucknow: Birbal Sahni Institute of Palaeobotany.

Sharma, D.V., K.C. Nauriyal and V.N. Prabhakar 2006. Excavation at Sanauli 2005-06: A Harappan Necropolis in the Upper Ganga – Yamuna Doab. *Puratattva* 36: 166-179.

Sharma, D.V., K.C. Nauriyal, V.N. Prabhakar and Vishnu Kant 2004. Sanauli: A Late Harappan Burial Site in the Yamuna-Hindon Doab. *Puratattva* 34: 35-44.

Sharma, G.R., V.D. Misra, D. Mandal, B.B. Misra and J.N. Pal. 1980. Beginning of Agriculture. Allahabad: University of Allahabad.

Singh, B.P. 2004. *Early Farming Communities of the Kaimur*. Jaipur: Publication Scheme.

Singh, P. 1992. Neolithic – Chalcolithic Cultures of Eastern Uttar Pradesh. In *Archaeological Perspective of Uttar Pradesh and Future Prospects*. Rakesh Tewari (ed.): 67-76. Lucknow: U.P. State Archaeological Organization.

Singh, P. 1993-94. Further Excavations at Imlidih Khurd -1993. *Pragdhara* 4: 41-48.

Singh, P. 1999. 'Rise of Cultures in Eastern India'. In *Dawn of Indian Civilization: Up to 600 BC*. History of Science, Philosophy and Culture in Indian Civilization (ed.) G.C. Pandey (General ed.) D.P. Chattopadhyay. New Delhi: Centre for Studies in Civilization.

Singh, P. 1994. *Excavations at Narhan (1984-89)*. Varanasi and New Delhi: Banaras Hindu University and B.R. Publishing Corporation.

Stamp, L.D. 1959. *Asia – A Regional and Economic Geography*. London: Methuen and Company Ltd.

Spate, O.H.K. 1967. *India and Pakistan – A Regional Geography*. London: Methuen.

Tewari, R., R.K. Srivastava, K.S. Saraswat and K.K. Singh 2000. Excavations at Malhar 1999: A Preliminary Report, District Chandauli (U.P.). *Pragdhara* 10: 69-98.

Tewari, R. and R.K. Srivastava 1997. Excavations at Raja Nal-ka-Tila (1995-96) District Sonbhadra (U.P.): Preliminary Observation. *Pragdhara* 7: 77-95.

Tewari, R. and R.K. Srivastava 1998. Excavations at Ṛaja Nal-ka-Tila (1996-97) district Sonbhadra (U.P.): Preliminary Observation. *Pragdhara* 8: 99-105.

Tewari, R., R.K. Srivastava and K.K. Singh 2004. Report of the Excavation at Malhar, District Chandauli (Uttar Pradesh) India, 1998-99. *Pragdhara* 14: 1-112.

Tewari, R., R.K. Srivastava, K.K. Singh, K.S. Saraswat and I.B. Singh 2002-03. A Preliminary Report of the Excavations at Lauradeva, District Sant Kabir Nagar, Uttar Pradesh 2001-2002: Wider Archaeological Implications. *Pradghara* 13: 37-68.

Tripathi, V. 1986. From Copper to Iron – A Transition. *Puratattva* 15: 75-79.

Tripathi, V. 2001. *The Age of Iron in South Asia Legacy and Tradition*. New Delhi: Aryan Books International.

Tripathi, 2008. *History of Iron Technology in India (From Beginning to The Pre-Modern Times)*. New Delhi: Rupa & Co. Infinity Foundation Series.

Tylecote, R.F. 1962. *Metallurgy in Archaeology*. London: Edward Arnold.

Wahal, L.M. 1971-72. In Session on OCP. *Puratattva* 5: 12-13.

Wheeler, R.E.M. 1959. Early India and Pakistan. London: Thames and Hudson.

Yule, Paul 1985. *Metal Work of the Bronze Age in India*. Mlinchen: Bonn C.H. Becksche Verlagsbuchhandlung.

Yule, P. 1989. The Copper Hoards of the Indian Subcontinent: Preliminaries Romisch Gemanischen Zestral Museum Mainz.

Table 1

^{14}C Dates of Mesolithic Sites of Vindhya-Kaimur and Ganga Plain

(All BP dates are based on 5568 years half-life of Radiocarbon, Calibrated dates are given in BC)

Site	*Sample No.*	*5568 Yrs. BP*	*Calibrated dates BC/AD*	*Culture*	*Material*
Damdama	GX-20829-AMS	8640±65	—	Phase-8	Bone
Damdama	GX-20827-AMS	8865±65	—	Phase-1	Bone
Lekhahia	TF-342	180±110	1673, 1753, 1796, 1994, 1950 cal. AD	Phase-4, Microliths and Pottery	Charcoal
Lekhahia	TF-417	3560±105	1908	Phase-3, Microliths and Pottery	Bone
Lekhahia	TF-419	4240±110	2895	Phase-1, Microliths	Bone
Lekhahia	GX-20983-AMS	8370±75	—	Phase-3	Bone
Lekhahia	GX-20984-AMS	8000±75	—	Phase-2	Bone
Mahadaha	BS-136	4010±120	2569, 2538, 2503	Mesolithic	Charred bone carbonate
Mahadaha	BS-137	2880±250	1044	Mesolithic	Charred bone carbonate
Mahadaha	BS-138	3840±130	2315	Mesolithic	Charred bone carbonate
Paisra	BS-675	7420±110	6223, 6195, 6187	Mesolithic	Charcoal
Sarai Nahar Rai	TF-1356/59	2860±120	1021	Microliths	Charred and semi-charred bone
Sarai Nahar Rai	TF-1104	10050±110	None	Microliths	Human bone Inorganic

Table 2

^{14}C Dates of Neolithic Sites of Vindhya-Kaimur and Ganga Plain

(All BP dates are based on 5568 years half-life of Radiocarbon. Calibrated dates are given in BC)

Site	*Sample No.*	*5568 Yrs. BP*	*Calibrated*	*Culture dates BC/AD*	*Material*
Chirand	TF-1032	3600±150	1961 cal. BC	Neolithic	Charcoal
Chirand	TF-1035	3125±100	1418 cal. BC	Neolithic	Charcoal
Chirand	TF-1031	3525±135	1884 cal. BC	Neolithic	Charcoal
Chirand	TF-1126	2290±120	391 cal. BC	Neolithic	Charcoal
Chirand	TF-1125	3365±150	1679 cal. BC	Neolithic	Charcoal
Chirand	TF-1127	3230±95	1516 cal. BC	Neolithic	Charcoal
Chirand	TF-1034	3420±110	1740 cal. BC	Neolithic	Charcoal
Chirand	TF-1036	2485±120	761, 681, 659, 596, 633, 577,	Neolithic 561 cal. BC	Charcoal
Chirand	TF-1033	3390±110	1730, 1729, 1689 cal. BC	Neolithic	Charcoal
Chirand	TF-334	2715±120	890, 845 cal. BC	Neolithic	Charcoal
Chirand	BS-129	4540±110	3338, 3213, 3203 cal. BC	Neolithic	Charcoal
Jhunsi	BS-2526	8140±220	7477, 7106, 7105, 7080 cal. BC	Neolithic	Unknown
Jhunsi	BS-2524	6760±190	5837, 5660, 5649, 5612 cal. BC	Neolithic	Unknown
Jhunsi	BS-2525	7110±170	6196, 5990, 5938, 5932 cal. BC	Neolithic	Unknown
Koldihwa	PRL-224	6570±210	—	Neolithic	Charcoal
Koldihwa	PRL-100	5440±240	—	Neolithic	Charcoal
Koldihwa	PRL-101	4530±185	—	Neolithic	Charcoal
Koldihwa	PRL-223	3300±120	1607, 1554, 1544 cal. BC	Neolithic	Charcoal

contd.

Site	*Sample No.*	*5568 Yrs. BP*	*Calibrated*	*Culture dates BC/AD*	*Material*
Kunjhun	BETA-6414	4010±110	2569, 2538, 2503 cal. BC	Neolithic	Unknown
Kunjhun	BETA-6415	4660±180	3360 cal. BC	Neolithic	Unknown
Kunjhun	BETA-4879	3120±70	1414 cal. BC	Neolithic	Unknown
Lahuradewa	BS-2145		3090, 2916, 2879 cal. BC	Neolithic	Charcoal
Lahuradewa	BS-2148		3363, (3328, 3323, 3174, 3159, 3119, 3106, 3105) 3020 cal. BC	Neolithic	Charcoal
Lahuradewa	BS-2151		3654, (3635, 3553, 3542) 3382 cal. BC	Neolithic	Charcoal
Lahuradewa	BS-1951	5320±90	4220, 4196, 4161 cal. BC	Neolithic	Charcoal
Lahuradewa	BS-1966	6290±160	5298 cal. BC	Neolithic	Charcoal
Lahuradewa	ERL-6442 -AMS		6442, 6376 cal. BC	Neolithic	Charred cultivated rice husk
Mahagara	PRL-409	3260±150	1523 cal. BC	Neolithic	Charcoal
Mahagara	PRL-407	3300±100	1607, 1554, 1544 cal. BC	Neolithic	Charcoal
Mahagara	BS-128	3330±100	1628 cal. BC	Neolithic	Charcoal
Tokwa	BS-2417	7530±230	6407, 6591, 6106 cal. BC	Neolithic	Unknown
Tokwa	BS-2369	6850±200	5725, 5976, 5561 cal. BC	Neolithic	Unknown
Tokwa	BS-2464	5620±310	4456, 4797, 4051 cal. BC	Neolithic	Unknown

Table 3

^{14}C Dates of Chalcolithic Sites of Vindhya-Kaimur and Ganga Plain

(All BP dates are based on 5568 years half-life of Radiocarbon. Calibrated dates are given in BC/AD)

Site	*Sample No.*	*5568 Yrs. BP*	*Calibrated dates BC/AD*	*Culture*	*Material*
Chirand	TF-1030	3430±110	1740 cal. BC	BRW Chalcolithic	Charcoal
Chirand	TF-444	2590±105	799 cal. BC	BRW Chalcolithic	Charcoal
Chirand	TF-1028	3390±90	1730, 1729, 1689	BRW Chalcolithic	Charcoal
Chirand	TF-1029	2915±85	1121, 1119, 1104 cal. BC	BRW Chalcolithic	Charcoal
Chirand	TF-445	3500±100	1877, 1834, 1824, 1793, 1787 cal. BC	BRW Chalcolithic	Charcoal
Koldihwa	PRL-56	820±100	1225 cal. AD	BRW Chalcolithic	Charcoal
Koldihwa	PRL-227	2050±110	92 cal. BC	BRW Chalcolithic	Charcoal
Koldihwa	PRL-102	2380±105	405 cal. BC	BRW Chalcolithic	Charcoal
Koldihwa	PRL-99	2380±105	405 cal. BC	BRW Chalcolithic	Charcoal
Lahuradewa	BS-1938		1519 (1435) 1399 cal. BC	BRW Chalcolithic	Charcoal
Lahuradewa	BS-2150		2012 (1884) 1750 cal. BC	BRW Chalcolithic	Charcoal
Mahisdal	TF-391	2900±150	1092 cal. BC	BRW Chalcolithic	Charcoal
Mahisdal	TF-392	2950±105	1211, 1180, 1165 cal. BC	BRW Chalcolithic	Charcoal
Mahisdal	TF-390	2725±100	894, 875, 850 cal. BC	BRW Late Chalcolithic	Charcoal
Sohgaura	PRL-178	3190±110BP	1491,1489, 1451 cal. BC	BRW Chalcolithic	Charcoal
Sohgaura	PRL-179	3090± 130 BP	1400 cal. BC	BRW Chalcolithic	Charcoal

Table 4

^{14}C Dates of Black-and-Red Ware (with iron) Sites of Vindhya-Kaimur and Ganga Plain

(All BP dates are based on 5568 years half-life of Radiocarbon. Calibrated dates are given in BC/AD)

Site	*Sample No.*	*5568 Yrs. BP*	*Calibrated dates BC/AD*	*Culture*	*Material*
Chirand	TF-336	2640±95 BP	809 cal. BC	Black-and-Red Ware Period Iron	Charcoal
Khairadih	PRL-1049	2890±150 BP	484,437,424 cal. BC	Black-and-Red Ware	Charcoal
Mahisdal	TF-389	2565±105 BP	794 cal. BC	Early Iron Age	Charcoal
Rajghat	TF-294	2190±85 BP	348,316,207 cal. BC	Black-and-Red Ware	Charcoal
Rajghat	TF-292	2350±95 BP	400 cal. BC	Black Slipped Ware	Charcoal
Sringaverpura	PRL-669	2620±130 BP	805 cal. BC	Black-and-Red Ware	Charcoal

Table 5

^{14}C Dates of Painted Grey Ware Sites of Ganga Plain

(All BP dates are based on 5568 years half-life of Radiocarbon. Calibrated dates are given in BC/AD)

Site	*Sample No.*	*5568 Yrs. BP*	*Calibrated dates BC/AD*	*Culture*
Hastinapur	TF-90	2270±110	383 cal. BC	Uppermost Painted Grey ware, Period II
Hastinapur	TF-112	2260±95	379 cal. BC	Upper most Painted Grey ware, period II
Hastinapur	UCLA-684	1800±100	227 cal. AD	Painted Grey ware Period II, Probably an intrusive burial?
Hastinapur	TF-85	2385±125	406 cal. BC	Late Painted Grey ware, Period II
Hastinapur	TF-83	2220± 110	362,282,258 cal. BC	Uppermost Painted Grey ware, Period II

contd.

Site	*Sample No.*	*5568 Yrs. BP*	*Calibrated dates BC/AD*	*Culture*
Hastinapur	TF-91	2450±120	752,709,530 cal. BC	Late Painted Grey ware, Period II
Hulas	PRL-HLS-TL-1	None	None	Period II, Painted Grey ware, late phase
Khalaua	PRL-67	2450±155	752,709,530 cal. BC	Painted Grey ware
Khalaua	TF-1228	2420±95	484,437,424 cal. BC	Painted Grey ware
Khalaua	PRL-68	2370±170	403 cal. BC	Painted Grey ware
Noh	TF-1144	2370±85	403 cal. BC	Painted Grey ware
Noh	TF -994	2560±100	794 BC	Painted Grey ware
Noh	UCLA- 703A	2480±250	760,684,656 638,592,586, 550 cal. BC	Painted Grey ware
Noh	UCLA-703B	2690±220	833 cal. BC	Painted Grey ware
Noh	TF-993	2600±145	801 cal. BC	Painted Grey ware
Sonkh	1-6277	2570±85	795 cal. BC	Painted Grey ware
Sonpur	TF-376	2510±105	767 cal. BC	Pre-NBP
Thapli	PRL- 732	2070±120	101 cal. BC	PGW
Thapli	PRL- 731	2030±140	43 cal. BC	PGW
Tilaurakot	TF-737	2235±95	368,273,268 cal. BC	PGW
Jodhpura	PRL-212	2270±100	383 cal. BC Painted Grey ware overlap	Black & Red Ware / PGW overlap

Table 6

^{14}C Dates and TL Dates of NBPW & Early Historic Sites of Vindhya-Kaimur and Ganga Plain

(All BP dates are based on 5568 years half-life of Radiocarbon. Calibrated dates are given in BC/AD)

Site	*Sample No.*	*Date BP/ 5568*	*Calibrated dates BC/AD yr half life*	*Culture/level*
Atranjikhera	TF-283	2150±105	192 cal. BC	Northern Black Polished Ware, Period IV

contd.

Site	*Sample No.*	*Date BP/ 5568*	*Calibrated dates BC/AD yr half life*	*Culture/level*
Atranjikhera	BM-193	2040±150	50 cal. BC	Painted Grey Ware/Northern Black Polished Ware overlap
Atranjikhera	TF-415	2450±200	752, 709, 530 cal. BC	Period II, Black and Red ware
Atranjikhera	TF-289	2550±105	791 cal. BC	Period II, Black and Red ware
Atranjikhera	TF-194	2410±85	410 cal. BC	Painted Grey Ware, Period III
Atranjikhera	TF-291	2415±100	512 cal. BC	Painted Grey Ware, Period III
Atranjikhera	BM-194	2420±150	484, 437, 424 cal. BC	Painted Grey Ware/ Northern Black Polished Ware overlap
Atranjikhera	TF-191	2890±105	1057 cal. BC	Painted Grey Ware, Period III
Atranjikhera	TF-287	1605±95	427 cal. AD	Painted Grey Ware, Period III
Atranjikhera	TF-284	2180±95	340, 322, 203 cal. BC	Northern Black Polished Ware, Period IV
Atranjikhera	TF-195	1845±95	137 cal. AD	Post-Northern Black Polished ware, Period IV
Atranjikhera	UW-XXXX	2407±150	489 cal. BC	Painted Grey Ware/Northern Black Polished Ware overlap
Atranjikhera	OXFORD - TL-ll1-C1	2280		None Ochre Coloured Pottery, Period I
Atranjikhera	OXFORD-TL-ll1-B4	1670	None	Ochre Coloured Pottery, Period I
Atranjikhera	OXFORD-TL-ll1-B5	1170		None Ochre Coloured Pottery, Period I
Atranjikhera	OXFORD-TL-ll1-C2	1250	None	Ochre Coloured Pottery, period I
Atranjikhera	OXFORD-TL-111-C3	2130	None	Ochre Coloured Pottery, Period I
Hastinapur	TF-88	2225±110	364, 279, 261 cal. BC	Lowest NBPW Pd-III
Hastinapur	TF-80/82	1940±110	66 AD	Uppermost NBPW Pd-III
Hastinapur	TF-81	2015±95	32 cal. BC	Uppermost NBPW Pd-III
Kausambi	TF-225	2285±105	390 cal. BC	Mid-level Mid-NBPW Pd-III

contd.

Site	*Sample No.*	*Date BP/ 5568*	*Calibrated dates BC/AD yr half life*	*Culture/level*
Kausambi	TF-105	2220±110	362, 282, 258 cal. BC	Late level Mid-NBPW Pd-III
Kausambi	TF-103	2295±105	415±110 BC, 391 cal. BC	Mid-level Late NBPW Pd-III
Kausambi	TF-219	2325±100	396 cal. BC	Mid-level Mid-NBPW Pd-III
Kausambi	TF-221	2385±100	406 cal. BC	Early level Mid-NBPW Pd-III
Kausambi	TF-226	2110±95	160, 138, 124 cal. BC	Late level Mid-NBPW Rampart II
Kausambi	TF -100	2160±95	196 cal. BC	Mid-level Mid-NBPW Pd-III
Kausambi	TF-104	2150±105	192 cal. BC	Late level Mid-NBPW Pd-III
Khairadih	PRL-1050	2060± 150	96 cal. BC	NBPW
Manjhi	PRL-980	1930±140	72 cal. AD	Late NBPW
Manjhi	PRL-983	2350±140	400 cal. BC	Early NBPW
Mathura	PRL-343	2150±100	192 cal. BC	Late NBPW
Mathura	PRL-340	2390±150	407 cal. BC	PGW and NBPW overlap
Mathura	PRL-333	2490±140	762, 678, 662, 627, 600 cal. BC	Late NBPW
Mathura	PRL-338	2280±100	387 cal. BC	Late NBPW
Mathura	PRL-342	2180±160	340, 322, 203 cal. BC	Early NBPW overlap
Mathura	PRL-339	2380±100	405 cal. BC	NBPW
Mathura	PRL-337	2340±100	399 cal. BC	Mid-NBPW
Mathura	PRL-336	2540±90	786 cal. BC	Mid-NBPW
Mathura	PRL-334	2600±150	801 cal. BC	Early NBPW
Narhan	BS-563	2240±100	370 cal. BC	NBPW Pd-III
Narhan	BS-564	2200±100	353, 306, 236 cal. BC	NBPW Pd-III
Narhan	BS-581	2100±100	151, 149, 117 cal. BC	NBPW
Rajghat	TF -293	2370±105	403 cal. BC	NBPW
Sohgaura	PRL-182A	2130±90	177 cal. BC	NBPW Pd-III
Sohgaura	PRL-183	2466±105	756, 692, 541 cal. BC	NBPW Pd-III

contd.

Site	*Sample No.*	*Date BP/ 5568*	*Calibrated dates BC/AD yr half life*	*Culture/level*
Sohgaura	PRL-182B	2290±400	391 cal. BC	NBPW Pd-III
Agiabir	BS-2641	2779±100	969, 797 cal. BC	NBPW Pd-III
Agiabir	BS-2846	2710±70	889±63 cal. BP	NBPW Pd-III
Juafardih (District Nalanda)	3528JFD-3	3010±90	1259 BC	NBPW Pd-II (8)
Juafardih	3529	3280±90	1562 BC	NBPW Pd-II (7)
Juafardih	3525	2850±80	1002 BC	NBPW Pd-II (6)
Juafardih	3526	2740±100	857 BC	NBPW Pd-II (8)

Table 7

C^{14} Dates for Early Iron Bearing Sites from the Ganga Plain and the Vindhya-Kaimur

Site	*Sample No.*	*Date BP/5568 yr half life*	*Calibrated dates BC/AD*
Raja Nal-ka-Tila, District Sonbhadra	BS-1378	2830±100	1118 (963) 859 BC
Raja Nal-ka-Tila	BS-1299	3060±110	1423(1307) 1144 BC
Raja Nal-ka-Tila	BS-1300	2890±80	1196-1188 BC
Raja Nal-ka-Tila	PRL-2047		1164-1143 BC, 1132-976 BC, 970-930 BC
Raja Nal-ka-Tila	PRL-2049	3050±90 BP	1406-1198 BC, 1186-1164 BC, 1143-1132 BC
Malhar, District Chandauli	BS-1623	3450±90	1882 (1743) 1639 BC
Malhar	BS-1593	3540±90	2012 (1882, 1836, 1834) 1742
Dadupur, District Lucknow	BS-1882	3270±80	1679 (1522) 1442
Dadupur	BS-1759	3380±160	1882 (1685) 1465
Dadupur	BS-1825	3430±90	1739 (1706) 1695
Lahuradewa, District Sant Kabir Nagar	BS-1939	2940±100	1205, 1205, 1188
Jhusi, District Allahabad	PRL-2077	2820±80	1107 (973, 956, 941) 844

Table 8

Radiocarbon Dates of Jhusi

Sl. No.	*Lab. No.*	*Trench details*	*Radiocarbon yrs BP BC/AD*			*Date in*	*Calibrated dates in BC/AD*
			Culture/ level	*half life 5568*	*half life 5730*		
AU/JHS/1	2068	C -12 (15) 510	Kushan	1850±80	1910±90	40±90 AD	AD 74 (133) 316
AU/JHS/3	2070	C-14 (30) 555	Late NBPW	2104±90	2200±90	250±90 BC	357 (195,173) 46 BC
AU/JHS/6	2070	C-15 (37) 1025	Mid NBPW	2430±90	2500±90	550±90 BC	763 (498,413) 393 BC
AU/JHS/8	2074	C-15 (43) 1165	Early NBPW	2520±90	2590±90	640±90 BC	799 (763, 676, 674) 393 BC
AU/JHS/9	2075	C-15 (46) 1210	Pre NBPW with iron	2650±90	2730±90	780±90 BC	897 (806) 789 BC
AU/JHS/12	2077	C-15 (49) 1240	Pre NBPW with iron	2820±90	2900±90	950±90 BC	1107 (973, 956, 941) 844 BC
AU/JHS/16	2081	C-15 (53) 1325	Pre iron (Chalcolithic)	2700±90	2780±90	830±90 BC	966 (830) 799 BC
AU/JHS/18	2083	C-15 (62) 1520	Pre iron (Chalcolithic)	3200±90	3290±90	1340±90 BC	1597 (1490, 480, 1450) 1400 BC

Table 9

Radiocarbon Dates of Raja Nal-ka-Tila

Sl. No.	*Laboratory Number*	*Layer/Depth*	*Radiocarbon dates in years BP/BC 5568 BP*	*Calibrated dates based on half life 5730 years*	*Calibrated*
1.	BS-1378 1996-97 Trench No. U-19	(6) 1.95-2.00#m With iron	2550±110 BP 600±110 BC	2626±110 BP 676± 110 BC	822 (773) 486 BC

contd.

Sl. No.	*Laboratory Number*	*Layer/Depth*	*Radiocarbon dates in years BP/BC 5568 BP*	*Calibrated dates based on half life 5730 years*	*Calibrated*
2.	PRL-2047 1996-97 Trench No. U-20	(6) 2.08-2.10#m With iron	2890±90 BP 940±90 BC	2980±90 BP 1030± 90 BC	1196 BC-1188 BC 1164 BC-1143 BC 1132 BC-976 BC 970 BC-930 BC
3.	BS –1299 1995-96 Trench No. A-l	Pit sealed by layer No. (6) With iron	2830±100 BP 880± 100 BC	2914±100 BP 960± 100 BC	1118 (963) 859 BC
4.	BS –1300 1995-96 Trench No. A-l	(6) 2.00#m With iron	3060±110 BP 1110± 110 BC	3150±110 BP 1200± 110 BC	1423 (1307) 1144 BC
5.	PRL-2049 1996-97 Trench No. T-19	(6) 2.00#m With iron	3050±90 BP 1100± 90 BC	3150±90 BP 1200± 90 BC	1406 BC-1198 BC 1186 BC-1164 BC 1143 BC-1132 BC
6.	PRL - 2046 1996-97 Trench No. U-19	(9) 2.80#m Without iron	3100±90 BP 1150± 90 BC	3200±90 BP 1250± 90 BC	1500 BC-1490 BC 1448 BC-1256 BC 1240 BC-1214 BC
7.	PRL -2045 1996-97 Trench No. U-20	(10) 2.90#m Without iron	3260±90 BP 1310± 90 BC	3360±90 BP 1410± 90 BC	1622 BC-1426 BC 1742 BC-1378 BC 1348 BC-1316 BC

Table 10
Radiocarbon Dates of Malhar

Sl. No.	*Laboratory Number*	*Radiocarbon dates in BP/BCE on the basis of half life 5568 years*	*5730 years*	*Cal BCE Stuiver et. al. one sigma*
1.	BS - 1623, MLR II Trench No. XAl, Layer No. (3) Depth 0.55 cm	3450±90 BP 1500± 90 BC	3550± 90 BP 1600± 90 BC	1882 (1743) 1639 BC
2.	BS - 1614, MLR II Trench No. Al, Layer No. (3) Depth 61-63 cm	6380±110 BP 4330± 110 BC	6570± 110 BP 4620± 110 BC	5475 (5358, 5351, 5340, 5329, 5323) 5262 BC
3.	BS - 1593, MLR II Trench No. Al, Layer No. (3) Depth 90-100 cm	3540±90 BP 1590± 90 BC	3650± 90 BP 1700± 90 BC	2012 (1882,1836,34) 1742 BC
4.	BS - 1590, MLR II Trench No. XAl, Layer No. (4) Depth 80 cm	3740±80 BP 1790± 80 BC	3850± 80 BP 1900± 80 BC	2283 (2141) 1984 BC

DILIP K. CHAKRABARTI

Problems and Perspective of the Ganga Plain Archaeology

(I)

The present paper is based on my study of the archaeological geography of the Ganga plain in 1991-2001 and 2003-2005 (Chakrabarti 2001, 2007). I focused only on three elements: city sites, the possible limits of the ancient geo-political units in terms of modern geography, and the network of routes which linked the city sites. This was preceded by my field-study of sites in the Chhotanagpur plateau (Chakrabarti 1993) and Bangladesh (Chakrabarti 1992) and has been accompanied in recent years by a field-study of the routes which linked the Ganga plain with the Deccan (Chakrabarti 2005). The alignments of arterial routes in the Deccan and the southern Peninsula were subsequently worked out (2004-2006), resulting in a clear idea of how the Gangetic plain can be thought as a part of a communication network reaching even the furthest regions of the south and the Deccan (Chakrabarti forthcoming). The Gangetic plain's links with Haryana and Indian Punjab, and the problem of the Sarasvati river formed the focus of a field-study in 2007-2008 (Chakrabarti and Saini forthcoming). My study of the Ganga plain archaeology is, thus, not conducted in isolation but as an integral part of the pan-Indian network.

Further, there have been major discoveries in different parts of the Ganga plain in recent years. These discoveries have brought about a systematic change in the ways we have so far looked at its archaeological development. In this paper, I shall first put forward a summary of my main observations on the historical geography of the ancient Ganga plain, and then discuss the implications of some of the recent discoveries made in various parts of this vast region.

(II)

My perception of the historical geography of the Bangladesh sector of the Bengal delta differs from the earlier perceptions in a number of ways. First, I believe that the antiquity of the territorial unit of *Samatata*, whose antiquity has not been directly attested before the 4th century AD and which has been generally identified with the trans-Meghna region, may go back to the period of *Mahajanapadas*. This argument is based on the presence of the early historic site of Wari-Bateshwar on an old course of the Brahmaputra near its junction with the Meghna river, and its radiocarbon date of *c.* 450/500 BC. Secondly, on the basis of this date and the location of this site, I argue that it was a port to cater to India's trade with south-east Asia through the Bengal delta, which is well attested in the *Jatakas* in the context of the 6th century BC. The political geography of the *Jatakas* is consistent in its emphasis on Kasi as an independent kingdom. Kasi is categorically known to have lost this status because of the growth of the power of Magadha under Bimbisara and Ajatasatru in the sixth century BC, and thus I believe that the *Jatakas* genuinely reflect the economic condition of the Ganga plain in the sixth century BC. South-east Asiatic trade is clearly mentioned in the *Jatakas* and now the date of the NBP-bearing Wari-Bateshwar provides a supportive archaeological evidence of this trade in about that period. Thirdly, in view of the fact that Wari-Bateshwar has a fortified inner core, this is likely to have been the capital of the ancient principality of *Samatata*. It is also probable that it later became a Maurya administrative centre, and if so, I would argue that the Mauryan control was likely to have extended as far east as the Chattagram coast which gives an access to the lower Irrawaddy valley through Arakan with which the Chattagram area has had traditional links. Fourthly, still later, with the development of the Roman trade in the Bay of Bengal, Wari-Bateshwar was likely to have been a port of call in the trade between south-east Asia and the Mediterranean region. I have identified this site with Ptolemy's *Souanagoura* and argued that the products of the upper Brahmaputra valley or Assam joined sea-trade through this site.

Our second major focus in the Bangladesh sector is Mahasthangarh or ancient *Pundranagara* on the bank of the Karatoya which was once a major river. The current excavators of the site put its beginning in the 4th century BC but their radiocarbon date is not from the lowest level of the site, and it is inherently improbable that Mahasthangarh is a later site than Wari-Bateshwar which dates from 500 BC. I believe both Mahasthangarh and Wari-Bateshwar to be *Mahajanapada* period sites. As far as the geographical linkages of Mahasthangarh are concerned, I draw attention to its possible role in the following routes: the Chumbi valley route to Tibet, the so-called southern Silk Route from Pataliputra *via*. Mahasthangarh to Assam and from Assam to the Bhamo area of north Myanmar and south China through the Hukong valley across the Patkoi range, and the route from the Mahasthangarh region or the ancient territorial unit of *Pundravardhana* to the Midnapur coast and Orissan coast further west. The last-mentioned route came to be known as the *Badshahi Sarak* in the Sultanate and later phases of Bengal's history.

The background of this development in the Bangladesh sector of the Ganga delta, or rather, the Ganga-Brahmaputra–Meghna delta, is uncertain, but I would infer the existence of an earlier black-and-red ware level, although this level has not yet been identified here. At Mahasthangarh black-and-red ware occurs with the NBP, and on the surface of Bangarh, located in the same geographical tract in the neighbouring West Bengal, I picked up a black-and-red ware sherd. The pre-NBP level of the *Samatata* or Wari-Bateshwar zone would need careful research.

In the West Bengal sector I focussed on three geographical segments: the continuation of the Mahasthangarh tract or the *Pundravardhana* territorial limits in West Bengal; the east bank of the Bhagirathi between Calcutta and Sagar island; and the region to the west of the Bhagirathi. There is one indisputably urban site in the first segment: Bangarh which lies on the route from Pataliputra to Mahasthangarh and has possibly a large contemporary settlement at Kandaran a little to the west on the same route.

On the east bank of the Bhagirathi, there is no early historic site till the vicinity of Calcutta, but between Calcutta and Sagar island there are about 11 major find-spots of antiquities which are sophisticated enough to suggest that the places which yielded them are urban sites. These antiquities mostly consist of splendid early historic terracottas, semi-precious stone beads, punch-marked and other coins, well-sculpted ivories, and even pieces of wooden sculpture. NBP and Rouletted ware are known to figure among the pottery. All these sites lie along an old bed of the Bhagirathi channel of the Ganga. The course of this bed is still largely visible. The most important site of the region, Chandraketugarh (ancient name unknown), is not located on the Bhagirathi channel but associated with an old channel of the Bidyadhari which flows somewhat to the east of the Bhagirathi and is called the Matla channel before joining the sea. Chandraketugarh is a fortified settlement but antiquities are also found over a wide countryside outside the fortifications. It has been identified with the city of Gange mentioned in the classical sources. The Mediterranean contact of Chandraketugarh is evident in certain terracottas, which imply that the potters of the day must have seen some Roman statuaries being imported to this riverine port. A south-east Asiatic contact is highly probable but no positive archaeological evidence has yet been recovered. The territory of ancient Ganga possibly stretched from the east bank of the Bhagirathi to near Dhaka in Bangladesh, and Chandraketugarh may be called its capital. There is no independent date from this site, but archaeologically, it should be as early as Wari-Bateshwar and Mahasthangarh.

To the west of the Bhagirathi, Tamluk or Tamralipta is located on the bank of the Rupanarayan which in its upper reaches is known as the Dwarakeshwar. The sequence at Tamluk begins with a Neolithic level which is possibly succeeded by a black-and-red ware horizon. Geographically, Tamluk is on the Midnapur/Medinipur coast which constituted the ancient *Suhma* territory. The traditional linkage of the area is with the Orissan coast and I infer that during the Mauryan period the area was under the control of Tosali. A large number of bone tools including harpoons have been reported from the Tamluk area, and I believe that this reflects an extension of the Neolithic level of Golbai Sasan near Khurda in Orissa.

North of the Midnapur coast or ancient *Suhma*, there are three ancient geographical units to the west of the Bhagirathi: southern and northern *Rarha* tracts (*Uttara Rarha* and *Dakshina Rarha*) and *Gauda*. The southern Rarha tract lay between *Suhma* and the modern Damodar river, and its capital was at Pokharna, an unfortified city site on the southern bank of the Damodar. The northern *Rarha* tract lay between the Damodar and the Ajay valley and had its capital at the unfortified urban site of Mangalkot (identified by me with a city called Barddhamana in some Jaina sources) which is located at the confluence of the Kunur and the Ajay. Kotasur, a fortified site on the bank of the Mayurakshi, was the capital of early historic *Gauda* which included parts of Murshidabad and Birbhum districts. Extensive early historic evidence has been obtained from these sites.

All these cities of the western part of modern West Bengal lay on the route which came not merely from the Mahasthangarh side but also from Bihar *via.* Rajmahal and eventually went to Tamralipta and the Orissan coast. This is an arterial route of eastern India. Secondly, this part of West Bengal is an extension of the Chhotanagpur plateau and was getting its minerals and stones from the core area of the plateau which lies further to the west.

The chronology of the early historic beginning in the Bhagirathi delta and the area to its west is not clear and has been generally ascribed to the third century BC Mauryan expansion. The whole area has a substantive black-and-red ware base and if there was urban development in *Samatata* around 500 BC, there is no geographical or historical reason why it should be later in this section of the delta. I ascribe the ancient urban growth of the area to the *Mahajanapada* period and to India's South-east Asiatic trade contacts (and later Roman contacts) and think that all the geographical units which we have mentioned were parts of the *Mahajanapada* geography.

(III)

One is not sure if there was a separate geo-political unit called *Kajangala* at the bordering areas of Rajmahal and Murshidabad in early history. It was there in the 7th century AD when Hsuan Tsang visited the area. No major site has yet been found in this section, although there is evidence of both black-and-red ware and NBP in the region.

On the southern bank of the Ganga in Bihar, there were two geo-political units: Anga based at Bhagalpur and Magadha based first at Rajgir and then at Pataliputra. The territory of Anga lay between the Kiul river in the north and the Sahibganj area of Bhagalpur, if not Rajmahal itself. Magadha lay between the Kiul river in the south and the Karamnasa river in the north and between the Kaimur hills in the west and the Ganga in the east. Anga offers a comparatively narrow strip of land between the Ganga and the Kharagpur and the Rajmahal hills. I believe that Anga also included a large part of the Santal Parganah upland, and similarly, Magadha also is likely to have extended both into the Kaimur and Chhotanagpur belts. It is unlikely that Anga extended into the area north of the Ganga.

The site which dominates from its high citadel the river traffic to Bengal is the site of Champa in the Nathnagar locality of modern Bhagalpur. The scale of the Champa citadel makes me feel that the river traffic which it controlled must have been very important. At the border of Anga and Magadha there are sites, although of the later periods, around modern Rajaona on the bank of the Kiul. The Ganga was the main communication line but there was also a route passing through the edge of the Kharagpur and Rajmahal hills and showing a scatter of sites, including some with black-and-red ware.

The first capital of Magadha, Rajgir, is more problematic. There is a chain of three sites in and about the hills of Rajgir: Old Rajgir in a narrow valley hemmed in by the hills, New Rajgir in the flat land outside this valley but with a fortified citadel, and Giriak which is partly hilly but otherwise overlooks a small river valley. It is equally likely that these settlements stand for three components of the ancient city: religious structures inside the hill-girt narrow valley, a normal city and administrative centre outside the valley, and possibly a trading-cum-habitational area at Giriak. Whatever it is, the famous cyclopean wall of Old Rajgir has been found to be of less than one metre height at the top of the surrounding hills and there is pre-NBPW occupation inside the valley overlooked by these hills.

My idea that Rajgir owed its importance not merely to the hills which surround it but also to its role as the place where the resources of the Chhotanagpur plateau – minerals, rocks and timber – used to join the Ganga valley trade network is adequately supported by the location of a fortified city site, Devangarh, in the Rajauli hills which separate the Hazaribagh section of the plateau from the Rajgir area.

The route which linked Champa with Rajgir came *via.* Sheikhpura and passed through the Nowada corridor to the Hisua area where Rajgir is located. Beyond Rajgir it moved up to Gaya and Bodhgaya. From Rajgir there was another route to Gaya *via.* the Barabar hills. Pataliputra could be approached from Rajgir either directly across the Son or by going over to the Ganga near Fatuha first and then moving up to Pataliputra. Between the three points of Gaya, Rajgir and Pataliputra there are a large number of sites including Nalanda and other major Buddhist ruins. There are a large number of more-than-life-size sculptures of the Buddha and others in this zone, the only zone where I have found such sculptures, but this remains unexplained. The Kaimur belt is important in the archaeology of Magadha. There was a route to Chakia and Banaras through the Kaimurs and this was linked to the routes which went in the direction of the Deccan. This route was easily accessible from Pataliputra along the Son valley. The importance of this route has been highlighted by the re-discovery of the large site of Nindaur on the road between Bhabua and Chakia. Apart from Pataliputra the most important river port of Magadha seems to be Buxar where the Ganga was crossed for the Ballia area of Uttar Pradesh.

A number of geographical units are mentioned in the context of north Bihar, *i.e.*, Bihar to the north of the Ganga: *Videha*, *Mithila*, *Tirabhukti*, *Vajji*. The distribution of city sites in north

Bihar does not quite match with these divisions. These sites are: Sikligarh (Purnea) Naulagarh, Jai Mangala Garh (both in the Begusarai sector), Mangalagarh and Pandavsthan (both in the Samastipur sector; Mangalagarh not visited; Pandavsthan reputedly a Kushan period township), Katragarh (Muzaffarpur sector), Balirajgarh, Kopagarh (Madhubani sector), Vaishali (Hajipur sector) and Manjhi (near Bihar/U.P. border). Except Jai Mangalagarh which has a moat or is encircled by a low land and has no visible fortification, and Pandavsthan which seems to be an open site, the others are all fortified, although I am not sure of Mangalagarh. Vaishali was apparently the focus of *Vajji* but one does not how to label Katragarh. This seems to be within the *Vajji* territory. Balirajgarh and Kopagarh are in the *Mithila* area, and I am willing to consider Balirajgarh as the capital of Mithila. But, where are *Videha* and *Tirabhukti*? Which geographical territory should we select to put the sites in Begusarai, Samastipur and Purnea in? *Tirabhukti* may fit the bill, but I am not sure, nor have I a clue to the identification of *Videha* at the ground level. Manjhi is near Ballia and it may be more rational to put Manjhi in the *Kasi* kingdom.

I am not sure I have understood the distribution of sites in terms of the ancient territories of north Bihar. The following routes are noteworthy. After crossing the Ganga at Chechar Kutubpur opposite Pataliputra, a road followed roughly the north bank of the Ganga for Purnea and beyond. Sikligarh falls on this route in the Purnea section. The sites like Naulagarh in the Begusarai-Samastipur sector also seem to be related to this route. Another route crossed the Ganga possibly in the Ram Chaura Ghat area and went in the direction of Vaishali or took the Mazaffarpur alignment both for Katragarh and Balirajgarh. A route also followed the Chhapra-Siwan-Maharajganj alignment, basically in the direction of Manjhi on the north bank of the Ghagra. The route which came for Kusinara from Vaishali went past the Kesariya *stupa* site and crossed the Gandak at Pipra Ghat for the Usmanpur-Jharmatiya sector near Kusinara. An extension of this route went beyond the Pipra Ghat area to Lauriya Areraj, Lauriya Nandangarh and Rampurva to reach Nepal through the Bhikna Tori pass, which was the major ancient route from Pataliputra to the Kathmandu valley.

The excavated city sites of north Bihar, especially their fortifications, have been dated by their excavators only to the second century BC. Such low dating of the NBP in north Bihar does not even bear discussion. Their chronology should be closely re-examined. It is impossible to think that the fortification of Vaishali which was an important settlement during the time of the Buddha, *i.e.*, the sixth century BC, is not earlier than the second century BC, a date which has been ascribed to it by the excavators.

Regarding the location of Pawa, the place where the Buddha halted before Kusinara, I would put it in the Usmanpur-Jharmatiya sector and not at Padrauna. Kusinara was not an important site when the Buddha reached it. The trans-Sarayu area of U.P. is Kosala which had at its eastern edge the small territories of the *Mallas*, *Sakyas* and *Koliyas*. These territories are identified on the basis of the locations of Kapilavastu, Lumbini and Banarasi Kalan. The Sal groves of the type of groves where the Buddha was born still flourish in this region, but considering the size of the settlement of Ganwaria it is difficult to call the Buddha's father an important king. It is probable that all the small territories of the area were later taken over by Kosala. From Sravasti to Lumbini, Kapilavastu and Tilaurakot there is a straight route and I would like to view the fortified settlement of Tilaurakot at the foot of the Nepal Siwaliks, first as a Kosalan and later as a Mauryan outpost.

(IV)

The general distribution of the major sites in the trans-Sarayu area can be understood with reference to the route which, coming from Pataliputra, crossed over to the Ballia side at Buxar. This goes to Khairadih *via.* the completely preserved fortified site of Pukka Kot, and the unfortified but major sites of Tika Deuri and Lakshman Dih. At Khairadih it crosses the Sarayu where on the opposite side there is a stamp of a monolithic stone column – in all probability a Mauryan column. There is a cluster of Buddhist and other structural sites in this sector, and through this area the road goes to the fortified city site of Kopia, and Basi which yielded an Asokan capital, and eventually reaches Kapilavastu and Lumbini. This must be the route which Asoka took to reach Lumbini. Sites in the Basti sector, especially Bharat Bhari and Bhuili, need more work to be understood. Siswania in the same sector has been identified with *Setavya*, a place mentioned in the course of the journey of some monks from Sravasti to Rajagriha.

The location of sites in eastern U.P. can be understood in relation to some major alignments. Banaras, the capital of the *Kasi* kingdom, was the terminal point of two major routes to the Deccan - one *via.* Sarguja and the second *via.* Agiabir, Mirzapur and Rewa. It was linked to Pataliputra *via.* Chakia. It was linked to Ayodhya and Sravasti *via.* the fortified settlement of Manhej near Jaunpur. The section of the Deccan route which went to Sravasti crossed the Ganga at Mirzapur for Manhej, Ayodhya and Sravasti. From near Akbarpur this route bifurcates towards the sites in Basti. A route also came from the trans-Sarayu area to Banaras, and there are two major sites – the fortified Nahush-ka-Tila and possibly unfortified Masaon Dih – on this route. It appears that the ancient *Kasi* kingdom comprised the territory up to modern Dohri Ghat on the one hand and up to the Karamnasa, the Kaimurs and the Robertsganj plateau on the other.

The ancient *Prayag* lay at Jhusi from where a route went along the Yamuna to Kausambi *via.* Bhita. Another route came out of Prayag to join the Mirzapur-Rewa alignment. The Yamuna was not crossed at Kausambi but at Mau, a little downstream, and here, in the Sankargarh area, the route out of Kausambi and the route out of Prayag and Bhita met and went in the direction of Rewa ascending the Vindhyan scarp either at Sohagi Ghat or Baldaha Ghat. The Sohagi Ghat ascent is marked by the Deur Kothar *stupa*. From Kausambi another route went past Balak Mau, crossing the Ganga at Kara and entering the Pratapgarh-Sultanpur sector where there are some major sites like Bihar and Chauharjan.

I find the Lucknow-Kanpur alignment particularly appealing not merely because Lucknow itself marks an ancient settlement going back to PGW period but also because the massive mound of Jajmau looms up as one approaches Kanpur, and beyond Kanpur the road leads straight to Musanagar where there is a crossing of the Yamuna to near its junction with the Betwa which leads one straight to the heart of central India past such ancient cities as Ehrich, Tumain, Eran and Vidisha.

Proceeding up the Yamuna from Kausambi, one encounters, in serial fashion, Reh, Musanagar, Chakranagar, Bateshwar, Mathura, Indraprastha, and a number of other massive mounds to the north of Delhi along the Loni-Saharanpur axis. The first four sites give access to central India whereas the sites in the western section of the Mathura district are oriented towards the Bayana and Bharatpur sections of Rajasthan and beyond. The most important city site between Kanpur/Jajmau and Mathura is Sankisa, a large fortified city with a number of Buddhist monastic ruins lying on its approach. Kampil, reputedly the capital of south Panchala is a site of average proportion. Atranjikhera is a massive site, only a limited portion of which is excavated. This lies on one of the routes from Mathura to Ahichchhatra, the other route being *via.* Sankara on the bank of the Ganga. A route from Mathura may also lead in the direction of Kashipur in the Nainital foothills *via.* Ahar on the bank of the Ganga in Bulandshahra. The city site of Kashipur was a place where the commerce both from the plains and the hills met. The sites in the area of Pilibhit and Lakhimpur Kheri were to an extent geared towards Nepal through the Tanakpur segment. I have been told that there is a Buddhist *stupa* site of pre-Christian era at Senapani which lies in the foothills a little to the west of Tanakpur. This means that the Tanakpur area provided an early entrance both to the hills and Nepal. It is also singularly interesting that copper anthropomorphs of the upper Ganga valley Copper Hoards have been reported from the Pithoragarh area which is approached from the plain only *via.* Tanakpur. This is a likely indication of the fact that this route to the Himalayas had somehow assumed significance as early as the middle of the second millennium BC which is a tentative date of the Ganga valley Copper Hoards.

There is a cluster of high and large sites near Etawah and Hathras, most of them located at the edge of marshy depressions and possibly on the top of natural mounds. The same is generally true of many mounds in Mathura. Regrettably, the character of these mounds is still largely unknown.

(V)

Our survey of the area which lies further to the north, *i.e.*, the area which comprises the Meerut-Ghaziabad-Moradabad-Bijnor and Saharanpur-Muzaffarnagar sectors and stretch up to the foothills, has added a new dimension to our understanding of the Harappan situation in western Uttar Pradesh. We focussed on the distribution of a black-on-red painted pottery which has been identified in the Harappan levels of Alamgirpur and Hulas. This painting tradition, according to our belief, goes back to the Early Harappan, as identified at Kalibangan. On the surface of the sites which yield such painted pottery, one also finds sherds with incised wavy designs between horizontal bands on their exterior. This pottery has been identified in the Early Harappan context at Dhalewan. This also occurs in Bhagawanpura IA and IB. My working hypothesis is that there was an Early Harappan base in western U.P., which need not have been as early as the Early Harappan in Haryana and Rajasthan. Its chronology is uncertain but it seems to have persisted long in western U.P., possibly even in the late Harappan phase. This was the base on which the mature Harappan sites of the area like Sanauli developed. This site near Baghpat was recently excavated, and when the importance of the site was first reported by me to the Archaeological Survey of India, some scholars in Delhi began to think that it was a Late Harappan site. However, the pottery so far isolated at Sanauli is only burial pottery because the villagers accidentally discovered only some of its burials. I think we should wait till the settlement part of the site is excavated and the site as a whole dated. To revert to our main point, we have found a large number of sites bearing Hulas-and-Alamgirpur-type black-on-red painted pottery up to the foothills. Tentatively, we feel that there was a development of Early Harappan tradition all over western U.P., whatever might have been its date. The Mature Harappan character of some of the sites of this region (cf. Alamgirpur, and possibly even Hulas and Sanauli) developed within this tradition, but the tradition itself could have lasted for a long time, including the Late Harappan phase, and eventually merge in the general stream of cultural development of the Doab. Some of these sites would need careful excavations before the idea can be given proper shape. At present it is a tentative hypothesis but a hypothesis to demonstrate the complexity of the Harappan tradition in western U.P.

In *Copper and Its Alloys in Ancient India*, a work which I published jointly with Nayanjot Lahiri in 1996, I related the upper Ganga plain Copper Hoards to the late Harappan tradition. According to D.V. Sharma, the excavator of Sanauli, an antennae sword has been found as a piece of burial goods in a Harappan burial there. This categorically establishes the validity of my assumption. However, it appears that we should also keep our mind open for the Copper Hoards to be a part of the Mature Harappan tradition as well. One has to await for dates from Sanauli. This is a singularly important new development in the archaeology of the Ganga plain.

Regarding the Ganga plain's links with the Himalayan region to its north or modern Uttarakhand, we note that by the time of the Painted Grey Ware most of the major entrances from the valley to the hills were known. These entrances are spread across the foothills from Kalsi to Tanakpur. As far as we understand it, the people from the plains did not move to the steep V-shaped valleys of the hills primarily for agricultural needs because these valleys were difficult places to settle. The find of Painted Grey Ware near Srinagar on the way to Kedarnatha and Badrinatha and the find of Copper Hoard implements from near Pithoragarh suggest that the routes from the plains to the area of Kedarnatha and Badrinatha and also to Pithoragarh which lies on the way to Mount Kailash were known at least by *c.* 1000 BC, if not earlier. This seems to throw some light on the archaeological antiquity of pilgrimage in Uttarakhand. The mineral and timber resources of this region must have been a source of attraction, but at the same time, the issue of pilgrimage cannot be swept aside.

Primarily concerned only with the location of sites, my work has been very humble. It has only tried to understand the visible site distribution in different areas in relation to the locations of major sites, their political geography and the routes which linked them. All that I hope for is that it has added some new insights into the geographical perspective of the archaeology of this vast region.

At the same time, I must admit that I have tried to understand the site distribution of the Ganga plain only on macro-level based on whatever little I understand about the history and archaeology of the plain. However, there is enough scope of extending this type of work to the micro-level. One hopes that this will be done and only then will be a more or less complete and detailed understanding of the long-range historical and geographical forces operative in the plain. Further, this is a type of work which can be done with little money, without subjecting oneself too much to the pressure of quest for funds.

Finally, I would utter a word of caution about the generally offered chronology of the early historic sites of the Ganga plain. Taking a total view of the situation in different sections of the valley, I would say that there is every reason to accept the fact that the urban growth took place all over the valley, as it did elsewhere in the sub-continent, between *c.* 800 and *c.* 500 BC. Some NBP could be locally produced, as an argument has been made in the case of Mahasthangarh, but there is no reason to glibly date such productions outside the core area only to the 3rd/4th century BC. The technique could have spread to these areas much earlier. If we accept the fact that the early historic urban growth in India happened between *c.* 800 and *c.* 500 BC, that makes the *Mahajanapada* phase of history far more important than we realize. I do not think that there were only sixteen major principalities. The Buddhist and Jaina texts are likely to have mentioned only those which were important from the point of view of their religions. Just because these texts mention 'sixteen principalities', it does not mean that there were only sixteen states in India during the time of the Buddha. Their number is likely to have been much more. There is no doubt that the *Mahajanapada* phase was the fountainhead of India's early historic development.

(VI)

In view of the 7th millennium BC antiquity for the cultivation of rice at Lahuradeva and all that it implies, I would say that one of the primary needs of the Ganga plain archaeology today is to understand the story of the expansion of its rice-based Neolithic economy elsewhere in the valley in both the eastern and western directions. If one lists the sites where Neolithic levels have been reached in excavations - Jhusi, Tokwa, Senuar, Taradih, Maner, Chechar-Kutubpur – one is impressed by the extent of the region they occupy. There is a very long period of Neolithic growth in this vast zone, and it is apparent that much regarding this history remains unknown. Secondly, in view of the discoveries at Malhar near Banaras and Dadupur near Lucknow, it is important to be aware of the significance of proto-historic metal trade in the region. The need for metallic artifacts in the plain was no doubt partly met locally, but even for that, ores had to come primarily from beyond the borders of the plain. I am not convinced by the claim that the iron-smelters of the Lucknow region could depend on the locally available Kankar deposits for their ores, because there is absolutely no record of pre-industrial iron-smelting from this region. The bulk of the metals – ores and artifacts – is likely to have come from the metal-rich areas outside the valley, and we must understand this issue area by area. The same thing can be said about the sources of various other raw materials and products. As far as the 'Chalcolithic' phase is concerned, we should devote some efforts towards the understanding of the regional pottery types. Until a proper comparative stratigraphy of the sites excavated in different parts of the valley is undertaken, we shall miss the significance of the local or regional elements. This is something which has not been done at all. The detailed ceramic analyses of the excavated materials from sites form an excellent topic of Ph.D. thesis, and I do not know why Ph.D. dissertations based on the excavated pottery of sites are so rare in the universities located in the Ganga plain. This is true not merely of the Chalcolithic phase but also of the later iron-bearing and historic levels. If we have to give some proper historical depth to the archaeology of the valley, we must be concerned with such ceramic details.

Finally, I find no academic merit in such terms as the 'Ganges civilization'. The civilization is 'Indian', of which the cultural developments in the Ganga valley were a part.

BIBLIOGRAPHY

Chakrabarti, D.K. 1992. *Ancient Bangladesh: A Study of the Archaeological Sources*. Delhi: Oxford University Press.

Chakrabarti, D.K. 1993. *Archaeology of Eastern India: Chhotanagpur Plateau and West Bengal*. Delhi: Munshiram Manoharlal.

Chakrabarti, D.K. 2001. *Archaeological Geography of the Ganga Plain: The Lower and the Middle Ganga*. Delhi: Permanent Black.

Chakrabarti, D.K. 2005. *The Archaeology of the Deccan Routes - The Ancient Routes from the Ganga Plain to the Deccan*. Delhi: Munshiram Manoharlal.

Chakrabarti, D.K. 2007. *Archaeological Geography of the Ganga Plain: The Upper Ganga (Oudh, Rohilkhand and the Doab)*. Delhi: Munshiram Manoharlal.

Chakrabarti, D.K. (forthcoming). *The Ancient Routes of the Deccan and the Southern Peninsula.*

Chakrabarti, D.K. and Sukhdev Saini (forthcoming). *The Problem of the Sarasvati River and Notes on the Archaeological Geography of Haryana and Indian Panjab*. Delhi: Aryan Books International.

UMESH C. CHATTOPADHYAYA

From Cultivation of Food Resources to the Cultivation of Social Relationships: A Critique of Near Eastern Neolithic Narratives in the Light of Archaeological Evidence from the Vindhya-Gangetic Complex

1. Introduction

The emergence of 'New Archaeology' in the sixties in reaction to the earlier culture-historical approaches was viewed in certain circles, following the Kuhnian notion of scientific revolution (Kuhn 1970), as a major triumph; nothing short of a paradigm shift (see Watson *et al.* 1971; Redman 1973).* The line of departure from the earlier trends was the refinement in method, *i.e.*, the incorporation of hypothetico-deductive logic rooted in logical positivism (Salmon 1982). However, the new 'scientific temper' with emphasis on techno-environmental determinism and logical positivism – latter in the classical physics mould – is no different from what was being abandoned in the twenties of the last century during a real paradigm shift from Classical to

---

* The term 'paradigm' can be understood, according to the Merriam-Webster online dictionary, "as a philosophical and theoretical framework of a scientific school or discipline within which theories, laws, and generalizations and the experiments performed in support of them are formulated; broadly: a philosophical or theoretical framework of any kind".

Quantum Physics (Heisenberg 1962; Capra 1975, 1982: chap. II). It is well known a fact that Neils Bohr's 'Copenhagen Interpretation of Quantum Theory' (1929) played a crucial role in bringing about this paradigm shift, by convincingly resolving a tricky problem regarding the nature of light; he interpreted light as a both wave and particle. According to the Classical Physics mode of explanation, rooted in the exclusionist, either/or logic, typical of the western intellectual tradition (Miller 1992), light was interpreted as either a wave or a particle because of its conflicting properties. But what is less know is the fact that this new idea was generated by Bohr from a chance encounter with an ancient Chinese text, *I-tching*, where all conceptual dualities (Yin and Yang, for example) are understood as manifestations of the same reality (Capra 1975). The point I wish to make is that *paradigm shifts can be facilitated by intercultural perspectives* – a point of great relevance for archaeology as well.

Historically speaking, four paradigms have been identified in archaeology: morphological, anthropological, ecological and geographical (Clarke 1972: 6-7). These, along with a later development – the Post-processual paradigm, if any (Hodder 1982, 1986), are actually variations within a dominant or Master Paradigm shaped by an age-old western 'metaphysics' of value-loaded oppositions and 'modernism' promoting a rationalist, but highly fragmented understanding of the world based on a logic of exclusion (either/or). As rationalism is supposed to be best developed in Europe, attempts were made to project a 'European' (or rather 'west' European/modern North American) model of archaeology that developed under the influence of 19th century modernity where techno-cultural 'progress' and 'revolution' constituted the catchwords, generally understood under the 'anagenetic' mode of cultural evolution (see Kirch 1980 and below). A paradigm shift in cultural theory, if any, from structuralist/modernist episteme to post-structuralist/post-modernist episteme, however, did not augment but rather impede the growth of archaeology, challenging even the notion of the past – the very basis of archaeological studies (Chattopadhyaya 2002). According to many, the chief limitation, and hence the principal criticism, of archaeology concerns the western way of producing the past and a denial of alternative interpretations. Third world archaeologies have generally supported this agendum as countries like India were committed to a postcolonial modernity since independence. However, possibilities were expressed by some non-western archaeologists since the Southampton World Archaeology Congress (1986) towards developing their own concepts of archaeology. So the call for a paradigm shift in Gangetic archaeology through the present Seminar is a demand of the time, and offers a unique opportunity towards contemplating on this need. For this sustained dialogues among archaeologists incorporating inter-cultural perspective is essential.

In promoting the idea of constructive feedbacks from other cultural traditions, which I think is vital for the growth of archaeological thoughts, I shall focus on Indian tradition, as one of the possible examples. I shall try to show that archaeological evidence from India with interpretations grounded in the local historico-cultural tradition, rather than in contemporary scientific rationality, can complement professional archaeology. I shall also argue that the singular archaeology should be revised to promote the plurality of approaches – to talk about archaeologies rather than archaeology, or more appropriately perhaps the 'inter-cultural archaeology'.

In a recent statement justifying the reasons for doing South Asian Archaeology, Michael Petraglia and Bridget Allchin have made a pertinent point:

> "The simple answer is that South Asia has its own remarkable finds, and an archaeological record that rivals in richness those in better known regions of the world. The more complicated and important reply, however, is that South Asia in addition has a distinctive archaeological record that challenges many of the models and theoretical frameworks that have emerged on the basis of findings made in these other regions. South Asia provides the opportunity to re-evaluate, refine and in some case revise a number of major conclusions concerning our evolutionary history, including the evolution of human behaviour, 'Out of Africa' models, the origins of sedentism and domestication, and the emergence of social complexity and urbanization."
>
> (Petraglia and Allchin 2007: 1; emphases added)

While appreciating and generally agreeing with these scholars on the importance of South Asian archaeological record, I shall argue, however, that it is not just India that has the potential to bring about a revisionist vision, the same applies to other parts of the world, including the pre-modern Europe itself. The problem has been the singularity of scientistic/modernist method applied to all these traditions with different epistemes, which the modernist/rationalist approaches in archaeology generally failed to understand and appreciate. To give an example, the postglacial developments in human cultures in the Near East, belonging to groups of people separated in time and space from modern Europe, has been written from an alien (modernist) point of view in utter disregard to the mentalities of the past peoples with rationale(s) that is not necessarily the same as that developed in modern Europe. This argument finds support from the view of Michel Foucault, one of the greatest post-structuralists, that it is not easy to develop a dialogue or understanding between two different epistemes with differing rationales.

In this paper I shall examine this issue in the context of archaeological writings on Neolithism, one of the most popular themes of enquiry. Our understanding of the 'event' called Neolithic and the process of the origins of farming, as a specific kind of adaptation towards 'food security' during the early Holocene, comes from a rigorous study of the prehistoric records of the Near East (Childe 1936; Braidwood 1967; Braidwood and Reed 1957; Hole *et al.* 1969; Flannery 1973; Singh 1974, 1990; Hutchinson *et al.* 1977; Reed 1977; Mellart 1994; De Laet 1994; Harris 1996c). It constituted multidisciplinary studies undertaken since 1920s by archaeologists belonging to two distinctive schools of thought and methodology: the culture-historical, and processual.* Most of the 'scientific' studies belonging to the culture-historical and processual schools of thought incorporated almost all the relevant branches of natural and social sciences, in exclusion generally though of anthropology (ethnographic records) of the region, and hence of the "middle-range" considerations so rigorously advocated by the processualists (Binford 1977, 1978). Any understanding of the possible social realities during the pre-history of the region was poorly compensated by insights from sociology, which is a study of modern industrialized societies. So there has been a tendency among such archaeologists to interpret 'alien'/unknown cultures of the past not through their own historical/internal accounts, but from a modern rationalist understanding of peoples or societies of a different time and episteme.

According to Shanks and Tilley (1987), archaeology is a four-fold hermeneutical enquiry as the levels of uncertainty here in the interpretation of the evidence is highest among all the branches of sciences because of both cultural and temporal gaps. It is because of this in-built problem that archaeology constitutes the most difficult, yet challenging, branch of all academic studies, though seldom realized by many archaeologists, preferring rather short-cut methods to impose their own rationalist ideas on what the past should look like.

Archaeology and Modernity

Archaeology, as a distinctive professional discipline, has its origins in the modern West. Throughout its course of development since mid-nineteenth century, it addressed specific questions about the human past, developed appropriate techniques and methods to tackle such issues, as well as conceptual tools of interpretations towards theorizing on past realities. This is all very commendable. The non-Western countries are indebted to the West for introducing archeology in their world and educating the peoples of their heritage. However, it is this educative programme that has had certain problems.

History of researches and writings in archaeology in general is a product of the rigorous Western intellectual tradition, shaped since the Renaissance and strengthened in subsequent Ages of Reason and Enlightenment, under the influence of modernism. The broad paradigm in this intellectual tradition, that also influenced archaeological writings, consists of at least three major parameters: (a) modernity, (b) rationality involving the logic of exclusion (either/or), rather than mutualism (simultaneous co-existence of two conceptual opposites), and (c) social reality, constructed through focused politico-economic pursuits in the form of colonialism and industrialization, for example. One of the peculiarities of this 'constructed' social reality is the near absence of cultural/socio-ethnic diversity brought about through systematic elimination of pre-modern subjects of the land itself since medieval times, if not earlier. It is this factor that largely prevented, barring some notable exceptions, modern Western scholars, howsoever, brilliant in their intellectual capabilities, to appreciate and comprehend the wider social reality for meaningful theoretical constructions.

---

* More recently a qualitatively distinct approach rooted in Post-processual method emerged with a fresh study of the Neolithic Çatalhöyök, with a focus on the ideological dimensions, rather than on environment-induced adaptations, of the early farming peoples (Hodder 2006).

Historiography of archaeology (or aspects thereof) that should constitute one of the thrust areas of research has unfortunately been ignored by archaeologists, as it has the potential to expose and challenge the mindsets of many of us. It is beyond the scope of present paper to elaborate on this emerging branch of study, so, I shall present here a brief critique of writings on Neolithism or the post-glacial cultural developments leading to food-production in the global context, and suggest that some of their limitations could be overcome by incorporating inter-cultural perspectives from Asia, Africa and the non-Westernised Australia and New World.

The Narratives on the Near Eastern Neolithism: A Critique

I wish to clear at the outset that the following critique of Western narratives on the phenomenon called the Neolithic is not meant to attack Western archaeologists or reject the researches so painstakingly carried out by them on the Neolithic cultures of the Near East, for example. The purpose is not to create a West-East dichotomy either. I only wish to complement their works by incorporating some insights gained from researches in the Vindhyas and the Gangetic plains towards strengthening archaeology and enhancing its scope.

The episode called 'Neolithic' has been celebrated in the archaeological writings as the first, most significant event of human economic life (De Laet 1994; Harris 1996a). We learn a new understanding of "humanity", tilted though in its pure economic dimension, from the organizer of one of the largest, multi-disciplinary conferences ever held on the origins and spread of agriculture, when he opens the proceedings with the following statement:

> *The question of how, when, where and why people first domesticated plants and animals, and abandoned the foraging life for that of farming, are central to an understanding of the history of humanity.*
>
> Harris (1996a: 1)

Archaeological approaches to addressing this issue has generally been grounded in evolutionary ecology and the concept of unilinear evolution. In the cultural sequences of various excavated sites of the Near East, the initial and end points were contrasted and marked out; a logical procedure was to fill up the temporal/evolutionary gaps with an assumption that the intervening period(s) followed a uniformly graduated process of techno-economic progress (cumulated development) destined towards the end point – the Neolithic village farming – and abandonment of the foraging ways of life. As we shall see below, the problem lies not so much in the ability to read the black and white end points, but the intervening grey area and the interpretation of the latter in which possibilities of the continuation of the foraging ways of life have been ignored.

The term Neolithic, associated with this new way of life, is also claimed to be a mark of human 'progress' because Man learnt for the first time to produce his own food and distinguished himself from his earlier stage of 'savagery' – to quote an oft-used, value-loaded (abusive) term in anthropological and archaeological literature. According to many archaeologists, it served as a platform for further cultural development and refinement leading to the rise of civilizations during the Bronze Age (Harris 1996a; Foster and Foster 2009).

The proper development of the term Neolithic to reflect a distinctive and specialized mode of subsistence/production, as opposed to the earlier 'Palaeolithic', could be traced perhaps from John Lubbock's *Pre-Historic Times*, first published in 1865 (Lubbock 1972; Singh 1974: 3; cf. Trigger 1989). While Lubbock's Eurocentric theoretical formulation with an emphasis on the Palaeolithic-Neolithic hiatus, was proved to be flawed, a renewed interest on Neolithism was initiated during the 1920s. This second trend was initiated essentially by V. Gordon Childe (1936; for Childe's seminal papers, see Patterson and Orser 2004). He and later archaeologists, particularly from the U.S.A. (especially, R.J. Braidwood), have tried to explain the transition from hunting-gathering to food-production in the Near East by demonstrating stratigraphically an evolutionary sequence of cultural events with techno-economic progression. Palaeoenvironmental studies constituted a strong point of focus in explaining the changes in human society. This region has been described by Childe as the "Hearth Area" of agricultural origins (around 9th millennium B.P.) associated with the cultivation of wheat and barley, on the one hand, and the domestication of sheep and goat, on the other (Childe 1936; Braidwood 1967; Hester 1976: chap. 10). The method of analysis was 'culture-historical' in which changes leading to the rise of agriculture in adjacent areas like Europe and South Asia were explained through the process of diffusion.

Problems

There are three inter-related problems associated with the available interpretations and reconstruction of the cultural developments during the post-glacial period. First (as mentioned above), efforts were made, even by the post-Childean archaeologists equipped with more advanced scientific techniques, to establish a clear-cut succession of archaeological cultures through an oversimplified, composite section of different developmental stages, viz., Late Epipalaeolithic/Mesolithic (PPNA), PPNB (three sub-phases – Early, Middle and Late), PPNC, Neolithic (with pottery), Late Neolithic, and so on, on the basis of the evidence derived from different sites in diverse settings of the region (for the continued use of such progressive divisions in the Levant, see Bogaard *et al*. 2009). Here one finds a tendency to discover a linear pattern of cumulative development. This might be one of the several other patterns that are perhaps missed out, such as oscillation between different options – abandonment and re-adoption of certain subsistence trait, for example. Each new stage/phase in the Chrono-stratigraphic column thus produced was shown to be a reflection of improvements towards economic innovations, sophisticated technologies and complex social structures with an overall impression that they almost 'suddenly' replaced earlier cultural forms. This attempt was consistent with the spirits and objectives of the modernist project and the dominant paradigm underlying researches in the social sciences, where breaks, discontinuity, ruptures, etc. were important points of emphasis in certain cases). The concept of 'acculturation' has been freely used in a unidirectional sense to prove the effacement and replacement of earlier cultural traits and values, whereas the term according to a standard definition provided by Franz Boaz, is a two-way process; the influence from the other side stands ignored. But even if there are continuities of earlier traits in subsequent cultural levels, archaeologists made little effort to identify and highlight this point, as if this was a trivial issue, outside the research goal. The second problem is that the Neolithic of the Near East was projected as the culmination of a specialized system associated with a narrow niche-width economy (cultivation of wheat and barley and domestication of sheep and goat); the possibilities of a broad-spectrum economy, *i.e.*, subsistence diversity (simultaneous co-existence of foraging and other modes of production), was overlooked. The third and final point is that in the available literature on the Near Eastern Neolithism one hardly observes any effort to study the important issue of social relationships. One of the objectives of the 1994 Conference on "The Origins and Spread of Agriculture and Pastoralism in Eurasia" was to study the "interactions between people, plants and animals" (Harris 1996b: 552), but *not between the peoples*. The archeological results rob of any idea about the possible long or short-term co-existence between two successive cultures in different modes of subsistence. The glaring omissions pointed out in the above three observations, deliberate or accidental, highlights the weaknesses and, perhaps, biases of the available archaeological studies in the Near East, howsoever scientific in orientation; they also put a question mark on the dominant paradigm associated with the 19th century scientific mode of thinking that operated then as it does now (barring a few notable exceptions) in archaeological researches.

Is the cultural sequence constructed by archaeologists from the Epipalaeolithic/Natufian through to the Neolothic and beyond, claimed to be a mark of cultural progression/evolution, a true reflection of the past reality, or an oversimplified narrative to communicate certain socio-political messages of contemporary concern? In trying perhaps to establish certain pre-figurations regarding past societies, are they not overlooking or hiding some evidence that might not fit into the modernist agenda of research? Should this narrative serve as an ideal/global model for other regions of the world to follow? This model, based on the concept of a unilinear mode of cultural evolution and the principle of techno-economic determinism, obliquely suggests, amongst others, a "clash of values" between two successive cultures with different modes of subsistence, on the one hand, and homogeneity (*i.e.*, the lack of socio-cultural diversity) at a single point of time, on the other. What it reflects is that either the technological developments leading to new modes of subsistence are intolerant to traditional modes of subsistence, or the groups belonging to the latter modes of subsistence are too eager to undergo cultural change in view of what archaeologists would argue as the "more advantageous" forms of techno-culture. In other words, people are by nature opportunist and they will grab any such opportunists even at the cost of their traditional identities.

Although there is enough ethnographic evidence from India and elsewhere to suggest that peoples in traditional modes of subsistence have an element of conservatism and guard their cultural values (Chattopadhyaya 1991). Even if they have to interact with those in agricultural mode of production, they show caution and resist acculturation (Gardner 1972). The best example comes from the Hill Pandaram and the Paliyans – the hunting-gathering communities of South India (Morris 1977; Gardner: 1972) – who maintained their identity with dignity in their day-to-day interactions with aggressive agriculturalists. The above mentioned expectation of opportunism falls in line with the modern situation where people are robbed of their traditional values because of peculiar socio-economic complexities – a gift of the industrialized world. Can we accept the outdated principle of 'uniformitariansm', *i.e.*, people behave much the same way as they did in the past, and *vice-versa* (Bailey 1981b)?

To address these questions it is important to make a fresh beginning in the study of the origins of farming and related issues in other regions of the world and compare the results with what has been theorized in the Near Eastern context. I strongly believe that the ever-growing archaeological data from the Vindhyas and the Ganga valley has the potential to present fresh insights into the social dynamics of peoples during early to middle Holocene period, which are lacking in the Near Eastern model, constructed under the influence of a culture-specific paradigm.

Late Pre-history of the Vindhyas and the Ganga Valley

Although considerable work has been carried out on the pre-history of the eastern Vindhyas since second half of the nineteenth century, the outstanding results of such works continue to remain an appendix to the world pre-history. Skipping these early works, I shall briefly focus on the works carried out on the late pre-history of the eastern Vindhyas and the middle Ganga valley by Indian archaeologists since 1960s. The available archaeological evidence from this region could be interpreted in various ways, but the dominant form of argument was shaped under the influence of the Near Eastern model based on a unilinear cultural evolution, leading to the discovery of agricultural origins as early as the sixth/seventh millennium BC (Sharma *et al.* 1980). Although this claim has been contested by many Indian archaeologists in the past, the subsequent excavations undertaken by the next generation archaeologists from Allahabad and Lucknow have convincingly re-established the original claims of G.R. Sharma.

It seems that the ultimate success for many enthusiastic Indian archaeologists depends upon whether this region, or for that matter other regions in the sub-continent, could be established as the earliest centre(s) of agriculture – clearly in response to the Near Eastern model of Neolithism. The purpose of my paper here is neither to challenge nor to support this research objective. I would rather like to argue that this line of thinking (second to none) does not add anything significant to challenge the afore-mentioned limitations of the Western 'construction' of the stereo-typed Near Eastern model of Neolithism and the underlying modernist paradigm promoting the same. Contemporary archaeology and its writings constitute a "language game" in Wittgensteinian sense where rules are made by a restricted group of practioners and the purpose should be to rise above this game or at best to change the rules of the game by interrogating the very research design.

There can be another form of interpretation of the evidence that constitutes the essence of my argument expressed elsewhere (Chattopadhyaya 1991, 2008), viz., the reflection of a wider social reality based on the principle of mutualism as opposed to that of exclusion, implicit in the West Asiatic model of Neolithism. This work was based on the principle of a partitioned social network system and ecological complementarity using the internal ethnographic and ethno-historical evidence (Chattopadhyaya 1991, 1996, 2008). In other words, the focus here is being shifted from content to intent (metaphoric 'extra' of the content) in conventional writings on the transition from the late Palaeolithic through to the Neolithic, as outlined above. But before elaborating on this focus, I would like to present the main results of the archaeological findings in the Vindhyas and the Ganga valley during the early to mid-Holocene and their interpretations.

1. The contributions of the University of Allahabad to the pre-history of the region are well known. But in the context of this paper a repetition cannot be avoided. During the sixties and seventies, G.R. Sharma and his colleagues of the University of Allahabad paid attention to the pre-history of the eastern Vindhyas and excavated a number of important Mesolithic and Neolithic sites. The former include the Rock Shelters like Lekhahia, Morahana Pahar, Baghai Khor along the Kaimur hilly tracts and Chopani-Mando, an open air site on an abandoned channel of the river Belan (Sharma 1965; Sharma *et al.* 1980; Varma 1986). The major Neolithic sites excavated are Koldihwa and Mahagara in the Belan valley, not far from Chopani-Mando (Misra 1977; Sharma *et al.* 1980). In the seventies, an extensive exploration was carried out in the central plains of the Ganga valley covering Allahabad, Pratapgarh, Sultanpur, Jaunpur and Varanasi districts of Uttar Pradesh resulting in the location and mapping of 200 sites that includes six Epipalaeolithic and 194 Mesolithic sites (Sharma *et al.* 1980). Three sites excavated in the Ganga valley include Sarai-Nahar Rai, Mahadaha and Damdama (Sharma 1973, 1975; Sharma *et al.* 1980; Pandey 1990; Pal 2002). In early eighties they excavated in collaboration with a team of archaeologists and geologists, headed by J. Desmond Clark, a number of sites – Baghor I (late Upper Palaeolithic), Baghor III (Epipalaeolithic/Mesolithic) and Baghor II (Mesolithic) as well as Kunjhun II (Neolithic) (Sharma and Clark 1983; Clark and Khanna 1989). Other Mesolithic sites excavated in the Son valley by the Allahabad group of archaeologists are Medhauli and Banki (Misra *et al.* 1992-93).

Chopani-Mando, according to the report (Sharma *et al.* 1980), presented a long-term cultural sequence, divided into the following phases/sub-phases:

I. Epipalaeolithic (Stratum 10)
II-A. Aceramic Mesolithic with non-geometric microliths (Strata 9-8)
II-B. Aceramic Mesolithic with geometric microliths (Strata 7-4), and
III. Ceramic Mesolithic with diminutive microliths (Strata 3-1)

The inspiration behind this evolutionary sequence seems to have been derived from the Near Eastern model, the only one available to archaeologists working in different regions of the world. The gradual technological development from Phase I to the subsequent two sub-phases does show a transition from the Palaeolithic to the Mesolithic. The last phase at Chopani-Mando, also termed as "Advanced Mesolithic", had several features generally associated with a Neolithic site, such as pottery (a unique type here) and a settlement pattern not dissimilar to what was discovered at the nearby Neolithic site of Koldihwa (Misra 1977). This was also described as the "Proto-Neolithic" phase because, despite the lack of evidence for the cultivation of rice or the domestication of animals, it served as a precursor of the full-fledged Neolithic farming economy reported from adjacent sites – Koldihwa, Mahagara and Panchoh (Sharma 1980). Although this was generally quite convincing an argument against the hiatus hypothesis, but it may be pointed out that this so-called transition from the Mesolithic to the Neolithic was not demonstrated at a single site. I wish to suggest that any discovery of a clear transition from the Mesolithic to the Neolithic at a single site is an idealized expectation, consistent with a kind of a unilinear cultural evolution similar in nature to the *anagenetic* mode of evolution (Kirch 1980), and perhaps contrary to the reality. I guess we are seeking a simple answer to a rather complex phenomenon. In fact Sharma's findings of a "so near, yet not so" evidence has in fact a lot of sense, if we consider another kind of cultural evolution in line with what is described as the *Cladogenetic* mode of evolution in biological studies. I shall come back to this point later.

It has been further suggested that the overall pattern of the cultural sequence noticed at Chopani-Mando existed at the Mesolithic sites of the Kaimur hills like Lekhahia, Baghai-Khor and Morahana Pahar with the recovery of pottery pieces from their late levels. These potsherds, however, showed affinity with the pottery recovered from the Neolithic sites of the region (Pal 1986).

The botanical remains from the Advanced Mesolithic phase at Chopani-Mando include wild rice, whereas those from the Neolithic sites of Koldihwa and Mahagara include both wild forms of rice (*Oryza rufipogon* and *Oryza nivara*) and the cultivated variety, (*Oryza sativa*), which reflect the co-existence of agricultural and foraging ways of life during the Neolithic period in this region (Table 1).

Table 1

Botanical Remains from the Mesolithic and Neolithic Sites in the Vindhyas and the Ganga Valley (After Bose 2009)

Site	*Cultural Context*	*Archaeobotanical Evidence*	*Reference*
Chopani Mando (Belan valley, Allahabad Distict, U.P.)	Advanced Mesolithic	**Cereals**: Remains of wild rice in the form of husk stuck with pottery and embedded in burnt clay lumps. **Other**: Bamboo	Sharma *et al.* 1980
Damdama (Middle Gangetic plains, Pratapgarh District, U.P.)	Mesolithic	Wild grasses (*Heteropogon contortus* & several indeterminate types); Goosefoot (*Chenopodium album*); and purslane (*Portulaca oleracea*). Seeds belonging to plant groups identified to family included buckwheat (*Polygonaceaae*), nightshade (*Solanaceaae*), and mind *labiatae*. Rice – both wild and cultivated varieties (Saraswat, quoted by Bose 2009)	Kajale 1990: 98-102; Pant 2001
Lekhahia (Kaimur Hills, Chandauli Dist., U.P.)	Mesolithic	**Cereals**: Wild rice (*Oryza rufipogon*), cultivated rice (*Oryza sativa*) **Others**: Wood charcoal remains of *Annogeissus pendula*, *Lagerstroemia speciosa*, and *Callicarpa arborea*	*Indian Archaeology: A Review* 1983-84: 178; Kajale 1991: 164
Koldihwa (Belan valley, Allahabad Distict, U.P.)	Neolithic (7th–5th millennia BC)	**Cereals**: Perennial wild rice (*Oryza rufipogon*), annual wild rice (*Oryza nivara*) and cultivated rice (*Oryza sativa*) **Pulses:** *Moong*	Misra 1977; Sharma *et al.* 1980: 184
Mahagara (Belan valley, Allahabad Distict, U.P.)	Neolithic (Dates controversial: 3rd–2nd mill. BC)	**Cereals**: Perennial wild rice (*Oryza rufipogon*), cultivated rice (*Oryza sativa*), and two carbonized grains of barley (*Hordeum vulgare*) **Others:** Bamboo,jujube, and a wild grass fruit of *Ischaemum rugosum*	Sharma *et al.* 1980; *Indian Archaeology – A Review* 1980-81: 110; 1981-82: 106; 1982-83: 149
Tokwa (District Mirzapur, U.P.)	Neolithic	**Cereals**: Rice, barley, and wheat **Others:** *Til* and mustard along with some fruits and beans	Misra *et al.*2000-2001: 65, 68; Pal 2008

contd.

Site	*Cultural Context*	*Archaeobotanical Evidence*	*Reference*
Baraunha (District Mirzapur, U.P.)	Neolithic	**Cereals**: Perennial wild rice (*Oryza rufipogon*), annual wild rice (*Oryza nivara*) and cultivated rice (*Oryza sativa*)	*Indian Archaeology – A Review* 1981-82: 106; 1982-83: 149; 1983-84: 178
Manigara (District Mirzapur, U.P.)	Late Neolithic	**Cereals**: Perennial wild rice (*Oryza rufipogon*), annual wild rice (*Oryza nivara*) and cultivated rice (*Oryza sativa*)	*Indian Archaeology – A Review* 1981-82: 106; 1982-83: 199; 1983-84: 177
Jhusi (Allahabad Dist., U.P.)	Neolithic	**Cereals**: Domesticate rice Rice (*Oryza sativa* L.), barley (*Hordeum vulgare* L.), bread-wheat (*Triticum* cf. *aestivum* L.), dwarf-wheat (*Triticum Spaherococcum* Perc.) **Pulses**: Lentil (*Lens culinaris*), Green-gram (*Vigna radiate* L.), Grass-pea (*Lathyrus sativus* L.), Field-peas (*Pisum arvense* L., *P. sativum* var. *arvense* L.), horse-gram (*Macrotyloma uniflorum*) **Others**: Linseed/flax, Anwala, Grape vine, Common Vetch, Job's Tear, etc.	Pokharia *et al.* 2009
Lahuradewa (Sant Kabir Nagar Dist., U.P.)	Neolithic IA (7th-5th millennia BC)	**Cereals**: Wild or weedy rice (*Oryza* cf. *rufipogon*), domesticated rice (*Oryza sativa*), foxtail millet (*Setaria* cf. *glauca*), job's tear (*Coix lachryma jobi*) **Others**: Goosefoot/Bathua (*Chenopodium album*), Mugwort/Artemis (*Artemisia* sp.), Catchfly (*Silene conoidea*)	Tewari *et al.* 2005-06a
Lahuradewa (Sant Kabir Nagar Dist., U.P.)	Neolithic IB (3000-2000 BC)	Cultivated rice (*Oryza sativa*), wheat, barley, pulses	Tewari *et al.* 2005-06b
Chirand (Dist. Saran, Bihar)	Late Neolithic	**Cereals**: Wild rice (*O. rufipogon*, *O. perennis*), cultivated rice (*Oryza sativa*), barley (*Hordeum vulgare*), wheat (*Triticum sphaerococcum*) **Pulses**: Lentil (*Lens culinaris*), filed pea (*Pisum*	Vishnu-Mittre 1972: 18-22; *Indian Archaeology - A Review* 1974-75: 78; 1975-76: 86

contd.

Site	*Cultural Context*	*Archaeobotanical Evidence*	*Reference*
		arvense), grass pea/khesari (*Lathyrus sattivus*), and *Moong* (*Phaseolus radiatous*). **Other**: *Sal* wood (*Shorea robusta*)	
Senuwar (Dist. Rohtas, Bihar)	Neolithic IA (c. 2200-1950 BC)	**Cereals**: Wild rice (*Oryza rufipogon*), cultivated rice (*Oryza sativa*), foxtail grass (*Sateria glauca*), job's tear (*Coix lachryma jobi*), barley (*Hordeum vulgare*), dwarf wheat (*Triticum sphaerococcum*), *jowar* millet (*Sorghum bicolor*), finger/*ragi* millet (*Eleusine coracana*)Pulses: Lentil (*Lens culinaris*), filed pea (*Pisum arvense*) and grass pea/khesari (*Lathyrus sattivus*)	Saraswat, typed manuscript mentioned by Bose (2009), above
Magha (District Mirzapur, U.P.)	Chalcolithic (Black & Red Ware c. 1200-600 BC)	**Cereals**: Wild Perennial (*Oryza rufipogon*) and cultivated rice (*Oryza sativa*), kodon millet (*Paspalum scrobiculatum*) **Others**: Grains of Sawan (*Echinochloa crusgalli*) and imprints of a fruit, *Ischaemum rugosum*	*Indian Archaeology – A Review* 1981-82: 106
Kakoria (District Chandauli, U.P.)	Chalcolithic	**Cereals**: Wild Perennial (*Oryza rufipogon*) and cultivated rice (*Oryza sativa*)	*Indian Archaeology – A Review* 1981-82: 106

The explorations in the middle Ganga valley by the Allahabad group and the excavations at three early Mesolithic sites, Sarai-Nahar Rai, Mahadaha and Damdama (Sharma 1973, 1975; Sharma *et al*. 1980; Pal 2002) opened avenues for new issues of research, including the seasonal movements of populations between the Vindhyas and the Ganga valley during the summer months (Sharma 1975). The presence of onsite burials at the above sites in conjunction with the occurrence of heavy duty food-processing stone artifacts and the faunal evidence suggests that the initial movement might have been seasonal in nature (residential mobility), but subsequently the peoples in the Ganga valley stayed there on an year round basis following logistic mobility, which means that home-based camps existed and parts of the populations moved out in different regions in different times of the year for various purposes (Chattopadhyaya & Chattopadhyaya 1990; Chattopadhyaya 1991; 1996; 2008). The economy was based on hunting, fishing and foraging

(Chattopadhyaya 1996; Bose 2009). The important point is the absence or near-absence of any evidence for farming during the Mesolithic period in this region, as at Chopani-Mando in the Vindhyas, although the sedentary nature of settlement came beforehand. The C-14 dates from the excavated sites of the Vindhyas and the Ganga valley suggest a time frame for the entire Mesolithic period between 8th and the mid 3rd millennia BC (see Table 2).

2. Subsequent researches in the entire Vindhya-Gangetic complex by archaeologists from Allahabad and Lucknow over the past two decades have thrown welcome light, especially on the Neolithic ways of life. I shall not repeat the results as they are available in various published works (for details on the Neolithic *vis-a-vis* agricultural origins, see Sharma *et al*. 1980; Tewari *et al*. 2005-2006a, b, 2007-2008; Singh 2008; Pal 2009; and contributions in this volume by authors like Sahi, Misra and Misra, Naseem, Saraswat, Sahi, Pal, and Singh). The important Neolithic sites excavated during this phase include, Lahuradewa in Sant Kabir Nagar district, U.P. (Tewari *et al*. 2007-2008), Tokwa at the confluence of the rivers Belan and Adwa, and Hetapatti and Jhusi in Allahabad district near the confluence of the rivers Ganga and Yamuna (Misra *et al*. 2004; Pal and Gupta 2005; Pal 2008, 2009). The subsistence base at these and earlier excavated sites of Koldihwa, Mahagara (Belan valley) and Kunjhun II (middle Son valley) shows the emergence of agriculture in the form of cultivation of rice (*Oryza sativa*) and domestication of cattle (*Bos indicus*) (Table 2).

Table 2

Radiocarbon Dates from the Mesolithic and Neolithic Sites of the Vindhyas and the Ganga Valley (After Possehl and Rissman 1992; Tewari *et al*. 2005-06a; Misra 2007 and Pal 2009)

Sites	*Cultural Context*	*^{14}C/TL dates in BC/BP*	*Calibrated ^{14}C dates in BC*
Sarai-Nahar Rai	Mesolithic	8395 ± 110 BC (TF-1104)	
Damdama	Mesolithic	AMS dates: 6690 ± 65 BC (GX 20829 AMS) 6915 ± 65 BC (GX 20822 AMS) TL: 7000-5000 BC	
Mahadaha	Mesolithic	6320 ± 800 BP (OxA-1647)	
Baghor II	Mesolithic	6380 ± 220 BC (PRL-715)	
Lekhahia RS-I	Mesolithic	3660 ± 110 BP (TF-417) 4360 ± 115 BP (TF-419) AMS dates: 6420 ± 75 BC (GX 20983 AMS) 6050 ± 75 BC (GX 20984 AMS)	2135–1755 3035 – 2780

contd.

Sites	*Cultural Context*	*^{14}C/TL dates in BC/BP*	*Calibrated ^{14}C dates in BC*
Chopani-Mando	Advanced Mesolithic	4540 ± 110 BP (BS-129)	
Koldihwa	Neolithic	4530 ± 185 BC (PRL-101) 5440 ± 240 BC (PRL-100) 6570 ± 210 BC (PRL-224)	5432 – 5051 6190 – 5764 7505 – 7033
Mahagara	Neolithic	1400 ± 150 BC (PRL-409) 1330 ± 120 BC (PRL-408) 1440 ± 100 BC (PRL-407) 1480 ± 110 BC (BAI/AU/ALLD/MGR-77-1) TL: 2265 & 1616 BC	
Kunjhun II	Neolithic	1565-1265 BC,2675-2665-2575 BC, 3530-3335 BC(Quoted from Misra 2007)	
Tokwa	Neolithic		4797, 5976, 6407 – Pal (2009: 16); Misra (2007) quotes another date, 6591 (BS-2417)
Jhusi	Neolithic		7110, 5649, 5938 Pal (2009: 16)
Lahuradewa Pd IA	Neolithic		BS-2145: 3090 (2916) 2879 BS-2148: 3363 (3328, 3223, 3174, 3159, 3119, 3106, 3105) 3020 BS-2151: 3654 (3635, 3553, 3542) 3382 BS-1951: 4220, 4196, 4161 BS-1967: 5298ERL-6442 (AMS): 6442 – 6378

contd.

Sites	*Cultural Context*	*^{14}C/TL dates in BC/BP*	*Calibrated ^{14}C dates in BC*
Lahuradewa Pd IB	Neolithic		BS-1950: 2135, 2078, 2056; BS: 2274: 2919 (2700) 2570; ERL-6903 (AMS): 2345–2200

The important conclusions that might be drawn from above investigations are as follows:

1. The claim for the rise of an early centre of agriculture in the Vindhyas and the Ganga valley complex during the seventh millennium BC seems to be justified on the basis of scientific studies of the botanical remains and the available radiocarbon chronology, including the AMS dating. The question whether it began first in the Vindhyas or in the Ganga valley is somewhat trivial as both the regions constituted parts of the same macro-region with regular movement of populations.

2. The introduction of agriculture associated with the cultivated variety of rice, *Oryza sativa*, during what we term as the Neolithic phase, did not alter the earlier subsistence pattern based on the exploitation of wild grains, especially rice. It is interesting to note that several wild forms of rice, exploited during the Mesolithic, continue throughout the Neolithic inclusing latter's late phase (as in Chirand, Senuwar, Manigara, etc.) as well as in post-Neolithic phases – the Chalcolithic and beyond (Kakoria, Magha) (Table 1). The appearance of wheat and barley in some of the Neolithic sites appear to be a late phenomenon (3rd and 2nd millennia BC) that might indicate cultural contacts with Harappan and other Chalcolithic cultures in the West.

3. The contemporary ethnographic evidence suggests the continued use of wild rice not only among the peoples in traditional modes of subsistence, but also among the modernised Hindus in certain festivals, such as the *Harchhat* in which ladies eat *Nivar*, a wild rice (also see Kharakwal and Yano 2007). Rituals and religious customs have been responsible for preserving the out of use grains, both wild and cultivated, including barley, which is regularly used in many religious ceremonies. In other words, India is a place where one doesn't find inhibition for adopting the new, but there is an equal tendency not to disregard the old, including for example prehistoric rock art symbols.

4. Ignoring the ambiguity regarding the conversions of uncalibrated into calibrated dates, what is unambiguous is the fact that there was a chronological overlap between the Mesolithic and the Neolithic for at least 4000 years (*c.* 6500 BC to 2500 BC) (Table 2).

5. Pottery was not invented during the Mesolithic period, except in the last phase at Chopani-Mando, but there is evidence from the Mesolithic Rock Shelter sites like Lekhahia in Kaimur

region to show the use of pottery similar to those used by the Neolithic communities in the Vindhyas. This is sufficient to suggest a kind of symbiotic relationships through cultural exchange between populations belonging to two different modes of subsistence.

The last four points are of paramount importance in providing a new insight against the stereotyped understanding of the process of Neolithism and Agricultural Revolution in the Near-Eastern model. As mentioned earlier, this model is essentially based on evolutionary ecology and cultural evolutionism inspired by the *Anagenetic* mode of evolution known in biological evolution (Kirch 1980). A strong emphasis has been on cumulative developmental sequence from the Epipalaeolithic through to the evolved Neolithic associated with a village farming economy. It was never questioned why such continuous accumulative changes took place. Was it because of continuously deteriorating environmental conditions and/or increasing population pressure? The environmental explanation is not based on solid foundations as the palaeo-environmental data are often contradictory to each other and it has not been possible to work out the problem at the micro-environmental level. The population pressure argument is circular; so we are left with a teleological explanation of little scientific merit.

An alternative understanding of the more complex process involving both dynamic and static scenarios and the inter-relationships between communities in different modes of subsistence, as advanced by this author, uses instead the concept of *Cladogenesis*, associated with the branching of populations from the parent groups and group proliferation according to different specializations (Chattopadhyaya 1991, 2008). This alternative approach, questioning the notion of cumulative cultural development, actually complicates the basic objectives in all Neolithic studies and explains why not a single site, at least in the Indian subcontinent, provides any evidence for direct onsite transition from the Mesolithic to the Neolithic. The rise of agriculture, one of the several other specializations (including pastoralism), can be understood as a result of a complex process of cladogenesis, *i.e.*, population bifurcations (branching off from parent groups), within the Mesolithic/foraging ways of life. We can no longer talk about a homogeneous Mesolithic with static hunter-gatherers.

An Alternative Model: The Question of Social Relationships and Social Banking

The archaeological evidence from the Mesolithic sites of the Vindhyas and the Ganga valley has been re-interpreted in the light of faunal evidence by the present author by applying the concept of "partitioned network system and ecological complementarity" that highlights the process of population diversification in line with *Cladogenesis* (Chattopadhyaya 1991, 2008). In his recent most work on the subject, the author (2008) has addressed an interesting question, raised by Marek Zvelebil (1986) on differential adaptational trajectories in the Near East and the temperate Europe. According to Zvelebil, "the Near-Eastern pathways resulted in genetic domestication of a mutually complementary set of species; the temperate pathway continued in the direction of technological specialization and intensive resource management, which did not, by and large, result in genetic domestication" (Zvelebil 1986: 174, cf. Jarman *et al.* 1982). A pertinent question is where does the evidence from the Vindhyas and the Ganga valley fit into? The archaeological evidence from this region suggests a distinctive response involving population diversification leading to socio-economic niche specialization, which is consistent with the ethnographic and ethno-historical evidence (Gadgil and Malhotra 1983; Chattopadhyaya 1991). Societal complexity in the Mesolithic Ganga valley, for example, within a hunting-gathering-fishing mode of subsistence, involving logistic pattern of mobility, onsite burial custom, large-scale production of bone/antler artifacts and an exchange system in a wider area indicates a special kind of adaptation (Chattopadhyaya 2000; Chattopadhyaya & Chattopadhyaya 1990; Chattopadhyaya 2008). If we include subsequent development to include the Neolithic or agricultural societies of this total macro-region, we are certainly witnessing a different, third trajectory, though not in any unilinear evolutionary sense.

The challenge is how to compare three trajectories, as it is neither easy nor appropriate to compare phenomena under dissimilar units of analysis. It is necessary to consider a wider unit where these regional patterns could converge. It was mentioned in the Introduction that origins of farming has been seen as a specific kind of adaptation towards 'food security' during the early Holocene. Herein lies a clue for comparison. We may consider the notion of two interrelated variables – security and savings (through storage, for example). It is here that all kinds of peoples of the past and the present, be they hunter-gatherers, farmers or even industrial communities, shed of their differences. The foraging populations during the Pleistocene period used resources that were distributed in their natural state of preservation, which is equivalent to what Tim Ingold calls 'ecological storage' (Ingold 1986: chap. 8). A lower population density and the residential mobility pattern, characteristic of Palaeolithic societies, ensured food security during the Pleistocene. But when the level of security decreases due to various factors – environmental, demographic, social – the ecological storage might be insufficient and there could be tendencies to invent more secured forms of storage, which is what happened during the post-glacial times in certain regions of the world. The genetic domestication of a mutually complementary set of species that developed in the Near East during post-glacial times might be termed, following Ingold, as the 'social storage' because of social controls operating on certain wild resources. Sedentism is a likely option under such situations. As far as the early Holocene temperate Europe is concerned, the reported practices of technological sophistication and intensive resource management also hinged around the notion of storage (Torrence 1983). The development here of large-scale storage facilities also promoted Sedentism. Now let us discuss the nature of storage/saving in the Vindhyas and the Ganga valley during post-Pleistocene times.

The palaeo-environmental evidence derived from the alluvial formations in the middle Son valley suggests a shift from cold and dry phase during the terminal Pleistocene to the warm and humid conditions during the early Holocene (Williams and Royce 1982). The eastern Vindhyas and the adjoining Gangetic plains taken together constituted a topographically heterogeneous unit. If one considers the trend of diversifying selection (Kirch 1980), this is an ideal region to promote population diversification into different ecological niches under certain conditions, such as palaeo-environmental changes and the rise of populations. Table 3, summarizes regional variability of the Mesolithic cultures in the area under study.

Table 3

Comparative Features of the Mesolithic Sites in the Vindhyas and the Ganga Valley (After Chattopadhyaya 2008)

Selected Features	*Son Valley*	*Kaimur Hills*	*Belan Valley*	*Vindhya-Ganga Edges**	*Ganga Valley*
Subsistence Base	Hunting-Gathering	Hunting-Gathering	Hunting-Gathering	? Hunting-Gathering	Hunting-Gathering-Fishing
Major Raw Material for Microliths	Chalcedony	?	Chert	Chalcedony/ Chert	Chalcedony/ Chert
Pottery	Absent	Present (Late levels)	Present (Late levels)	—	Absent
Formal Cemetery	Absent	Present	Absent	—	Present
Evidence of Structure	Post holes	Rock shelters	Post holes	—	?
Mobility Pattern	Residential	?	?	?Residential	Logistic
Distinctive Feature/ Specialization	Heat treatment of stone nodules: a local tradition	Rock painting	?	Factory site/ Trade in stone tools	Manufacture of bone/antler artefacts

* The sites of Barkaccha and Siddhapur (after Allchin 1974).

Although we have evidence for the genetic domestication of rice and cattle during the Neolithic period as a form of 'social storage', this concept of the 'social' is not restricted to domesticated resources alone. Genetic domestication here ran parallel to other forms of subsistence practices noticed not only in various Mesolithic sites, but also within the Neolithic sites as well.

The rationale behind the co-existence of the two modes of subsistence was to go for *double security* regarding food resources. There are problems with an exclusive agricultural economy as it involves a delayed return of the labour investment and is vulnerable, at the same time, to periodic crop failures. It also restricts movements, so vital for information sharing and overall health. The wisdom of keeping traditional subsistence practices 'alive' alongside agricultural practices is doubly beneficial for the hunter-gatherers, fishers, pastoralists, etc., on the one hand, and agriculturalists, on the other. In the context of the Mesolithic culture, the author wrote: "… groups in certain warm zones with environmental and topographic heterogeneity, the Vindhya-Ganga complex for example, seem to have invested in flexible 'social banks', comprising ecologically partitioned and occupationally specialized groups with their informal assurance of 'credit' during the time of need" (Chattopadhyaya 2008: 99). Indeed, exchange or trade of different items – both food and non-food resources – has been a regular feature in the area under consideration since early Holocene times (*Ibid*.). In this context it might be relevant to quote Geoff Bailey's following statement: "Trade in foodstuffs may be seen as the spatial analogue of food storage, in that it represents the transfer of food from an area of surplus to an area of scarcity, as compared with the transfer of people from place to place, characteristic when food is absent" (1981a: 8). Resource partitioning strategy, subsistence diversity and socio-cultural complementarity are some of the key concepts underlying this mechanism of coping with resource stress and, therefore, constituted an efficient and assured form of utilizing and 'sharing' the wider resource base by different groups. The 'cultivation' of social relationships among groups of various specializations (social banking), parallel to the cultivation of plants, doubly ensured food security to a diverse sections of the society.

Conclusion

In conclusion, it may be mentioned that the archaeological evidence from the Vindhyas and the Ganga valley of early-mid Holocene times and its interpretations have great potential towards generating qualitative ideas, otherwise missing in the Near Eastern model. The contributions of western archaeologists to the development of archaeology, especially in the domain of field and analytical techniques is great, it is the theoretical side that often appears problematic to non-western archaeologists, largely due to formers' commitment to a modernist project and the non-incorporation of the local ethnographic evidence, that needs to be strengthened by incorporating ideas from studies preferably by non-western scholars in their respective regions. As inter-cultural perspective works like catalysis in bringing about paradigm shift (as in physics), it is hoped that continued exchange of ideas and differing interpretations in future among archaeological communities of the West and the Rest will be a big step forward towards achieving a New Paradigm. It is this hope that keeps archaeology alive and makes it a meaningful intellectual pursuit.

BIBLIOGRAPHY

Allchin, B. 1974. Siddhapur and Barkachha: Two Stone Age Factory Sites in Uttar Pradesh. In *Perspectives in Palaeoanthropology*. A.K. Ghosh (ed.): 235-48. Calcutta: Firma K.L. Mukhopadhyay.

Bailey, G.N. 1981a. Concepts of Resource Exploitation: Continuity and Discontinuity in Palaeoeconomy. *World Archaeology* 13: 1-15.

Bailey, G.N. 1981b. Concepts, Time-scales and Explanations in Economic Prehistory. In *Economic Archaeology*. J.A. Sheridan and G.N. Bailey (eds.): 97-117. Oxford: British Archaeological Reports International Series 96.

Binford, L.R. 1977. General Introduction. In *For Theory Building in Archaeology*. Idem (ed.): 1-13. New York: Academic Press.

Binford, L.R. 1978. *Nunamiut Ethnoarchaeology*. New York: Academic Press.

Bose, Shibani 2009. Human-Plant Interactions in the Middle Gangetic Plains: An Archaeobotanical Perspective (From the Mesolithic up to *c*. Third Century BC). In *Ancient India: New Research*. U. Singh and N. Lahiri (eds.): 71-123. New Delhi: Oxford University Press.

Bogaard, A., M. Charles, K.C. Twiss, A. Fairbrain, N. Yalman, D. Filipovic, G.A. Demirergi, F. Ertug, N. Russell, and J. Henecke 2009. Private Pantries and Celebrated Surplus: Storing and Sharing Food at Neolithic Çatalhöyök, Central Anatolia. *Antiquity* 83: 649-68.

Braidwood, R.J. 1967. *Prehistoric Men*, 7th edition. Glenview: Scott, Foresman.

Braidwood, R.J. and C.A. Reed 1957. The Achievement and Early Consequences of Food Production: A Consideration of the Archaeological and Natural-Historical Evidence. *Cold Springs Harbor Symposium on Quantitative Biology* 22: 19-32.

Capra, Fritjof 1975. *The Tao of Physics*. Berkeley: Shambhala.

Capra, Fritjof 1982. *The Turning Point*. London: Flamingo.

Chattopadhyaya, Indrani 2000. 'Writing' in Space: An Interpretation of Prehistoric Mortuary Practices in the Central Ganga Valley. *Journal of Human Ecology* 11 (1): 33-48.

Chattopadhyaya, Indrani, and U.C. Chattopadhyaya 1990. The Spatial Organization of Mortuary Practices in the Mesolithic Ganga Val ley: Implications for Territoriality. In *Adaptation and Other Essays*. N.C. Ghosh and S. Chakrabarti (eds.): 103-21. Santiniketan: Vishva-Bharati.

Chattopadhyaya, U.C. 1991. *A Study of Subsistence and Settlement Patterns during the Late Prehistory of North-Central India*. Ph.D. dissertation. Cambridge: University of Cambridge.

Chattopadhyaya, U.C. 1996. Settlement Pattern and the Spatial Organization of Subsistence and Mortuary Practices in the Mesolithic Ganges Valley, North-Central India. *World Archaeology* 27 (3): 461-76.

Chattopadhyaya, U.C. 2002. The Post-Modern Denial of the Past: Challenges before Archaeology in the Twenty-First Century. In *Peeping through the Past: Prof. G.R. Sharma Memorial Volume*. S.C. Bhattacharya, V.D. Misra, J.N. Pandey and J.N. Pal (eds.): 169-82. Allahabad: University of Allahabad.

Chattopadhyaya, U.C. 2008. Post-Pleistocene Adaptations in the Vindhya-Ganga Valley Complex. *Quaternary International* 192: 89-101.

Childe, V.G. 1936. *Man Makes Himself*. London: C.A. Watts and Co.

Clark, J.D., and G.S. Khanna 1989. The Site of Kunjhun II, Middle Son Valley and its Relevance for the Neolithic of Central India. In *Old Problems and New Perspectives in the Archaeology of South Asia*. J.M. Kenoyer (ed.): 29-46. Madison: Wisconsin Archaeological Reports.

Clarke, D.L. 1972. Models and Paradigms in Contemporary Archaeology. In *Models in Archaeology*. D.L. Clarke (ed.): 1-60. London: Methuen.

De Laet, Sigfried J. 1994. From the Beginnings of Food Production to the First States. In *History of Humanity, Volume I: Prehistory and the Beginnings of Civilization*. S.J. De Laet (ed.): 366-76. Paris and London: UNESCO and Routledge.

Flannery, K.V. 1973. The Origins of the Village as a Settlement Type in Mesoamerica and the Near East: A Comparative Study. In *Ecology and Agricultural Settlements*, Book 3. R. Tringham (ed.): R1-1–R1-31. Andover, Mass: Warner Modular Publications.

Foster, B.R., and K.P. Foster 2009. *Civilizations of Ancient Iraq*. Princeton: Princeton University Press.

Gadgil, M., and K.C. Malhotra 1983. Adaptive Significance of the Indian Caste System: An Ecological Perspective. *Annals of Human Biology* 10: 454-78.

Gardner, P.M. 1972. The Paliyans. In *Hunters and Gatherers Today*. M.G. Bicchieri (ed.): 404-47. New York: Holt, Rinehart and Winston.

Harris, David R. 1996a. Introduction: Themes and Concepts in the Study of Agriculture. In *The Origins and Spread of Agriculture and Pastoralism in Eurasia*. D.R. Harris (ed.): 1-9. London: UCL Press.

Harris, David R. 1996b. The Origins and Spread of Agriculture and Pastoralism in Eurasia: An Overview. In *The Origins and Spread of Agriculture and Pastoralism in Eurasia*. D.R. Harris (ed.): 552-73. London: UCL Press.

Harris, David R. (ed.) 1996c. *The Origins and Spread of Agriculture and Pastoralism in Eurasia*. London: UCL Press.

Heisenberg, Werner 1962. *Physics and Philosophy*. New York: Harper & Row.

Hester, J.J. 1976. *Introduction to Archaeology*. New York: Holt, Rinehart and Winston.

Hodder, I. (ed.) 1982. *Symbolic and Structural Archaeology*. Cambridge: Cambridge University Press.

Hodder, I. 1986. *Reading the Past: Current Approaches to Interpretation in Archaeology*. Cambridge: Cambridge University Press.

Hodder, I. 2006. *Çatalhöyük: the Leopard's Tale, Revealing the Mysteries of Turkey's Ancient 'Town'*. London: Thames and Hudson.

Hole, F., K.V. Flannery and J. Neely 1969. *Prehistory and Human Ecology of the Deh Luran Plain*. Ann Arbor: Museum of Anthropology, University of Michigan, Memoir No. 1.

Hutchinson, J., J.G.D. Clark, E.M. Jope, and R. Riley (eds.) 1977. *The Early History of Agriculture*. Oxford: Oxford University Press.

Ingold, Tim 1996. *The Appropriation of Nature: Essays on Human Ecology and Social Relations*. Manchester: Manchester University Press.

Jarman, M.R., G.N. Bailey and H.N. Jarman (eds.) 1982. *Early European Agriculture*. Cambridge: Cambridge University Press.

Kajale, M.D. 1990. Some Initial Observations on Palaeobotanical Evidence for Mesolithic Plant Economy from Excavations at Damdama, Pratapgarh, Uttar Pradesh. In *Adaptation and Other Essays*. N.C. Ghosh and S. Chakrabarti (eds.): 98-102. Santiniketan: Vishva-Bharati.

Kajale, M.D. 1991. Current Status of Indian Palaeoethnobotany: Introduced and Indigenous Food Plants with a Discussion of the Historical and Evolutionary Development of Indian Agriculture and Agricultural Systems. In *New Light on Early Farming: Recent Development in Palaeoethnobotany*. Jane Renfrew (ed.): 155-89. Edinburgh: Edinburgh University Press.

Kharakwal, J.S. and A. Yano 2007. Rice Cultivation: Associated Rituals and Festivals with Special Reference to Central Himalayas. In *Traditional Knowledge System and Archaeology with Special Reference to Uttarakhand*. D.P. Agrawal, M. Shah and S. Jamal (eds.): 83-99. New Delhi: Aryan Books International.

Kirch, P.V. 1980. The Archaeological Study of Adaptation: Theoretical and Archaeological Issues. In *Advances in Archaeological Method and Theory*. M.B. Schiffer (ed.) 3: 101-56. New York: Academic Press.

Kuhn, Thomas S. 1970. *The Structure of Scientific Revolution*. Chicago: Chicago University Press.

Lubbock, John 1872. *Prehistoric Times as Illustrated by Ancient Remains and the Manners and Customs of Modern Savages* (3rd edition). London: Williams and Norgate (First edition, 1865).

Mellart, James 1994. Western Asia during the Neolithic and the Chalcolithic (About 12,000-5,000 years ago). In *History of Humanity, Volume I: Prehistory and the Beginnings of Civilization*. S.J. De Laet (ed.): 425-40. Paris and London: UNESCO and Routledge.

Miller, D.K. 1992. *The Reason of Metaphor: A Study in Politics*. New Delhi: Sage India Pvt. Ltd.

Misra, V.D. 1977. *Some Aspects of India Archaeology*. Allahabad: Prabhat Prakashan.

Misra, V.D. 2007. Stone Age Cultures, Their Chronology and Beginnings of Agriculture in North-Central India. *Man and Environment* 32 (1): 1-14.

Misra, V.D., B.B. Misra, U.C. Chattopadhyaya, P. Sinha and D.K. Shukla 1992-93. Excavations at the Primary Context Mesolithic Occupation Site of Banki, District Sidhi, M.P.: A Preliminary Report. *Pragdhara* 3: 5-10.

Misra, V.D., J.N. Pal, and M.C. Gupta 2004. Significance of Recent Excavations at Tokwa in the Vindhya and Jhusi in the Gangetic Plain. *Journal of Interdisciplinary Studies in History and Archaeology* 1 (1): 120-27.

Misra, V.D., J.N. Pal, and M.C. Gupta 2000-2001. Excavation at Tokwa: A Neolithic-Chalcolithic Settlement. *Pragdhara* 11: 59-72.

Misra, V.N. 2002. Mesolithic Culture in India. In *Mesolithic India.* V.D. Misra and J.N. Pal (eds.): 1-66. Allahabad: University of Allahabad.

Morris, B. 1977. Tappers, Trappers and the Hill Pandaram. *Anthropos* 72: 225-41.

Pal, J.N. 1986. *Archaeology of Southern Uttar Pradesh: Ceramic Industries of Northern Vindhyas.* Allahabad: Swabha Prakashan.

Pal, J.N. 2002. Mesolithic Gangetic Plain In *Mesolithic India.* V.D. Misra and J.N. Pal (eds.): 280-305. Allahabad: University of Allahabad.

Pal, J.N. 2005. The Beginning of Agriculture in the Middle Ganga Plain with Special Reference to the Evidence of Recent Excavations at Jhusi. In *Agriculture in South Asia's History: Issues and Paradigms*, pp. 1-7. New Delhi: Indian Council of Historical Research.

Pal, J.N. 2009. Beginnings of Agriculture in the Middle Ganga Plain (Presidential Address, Ancient History Section, XXth session of the U.P. History Congress), Department of Humanities and Social Sciences, V.B.S. Purvanchal University, Jaunpur (Uttar Pradesh), 3-4 October, 2009.

Pal, J.N. 2008. Recent Excavations at Tokwa: Fresh Light on the Early Farming Culture of the Vindhyas. In *History of Science, Philosophy and Culture in Indian Civilization*, Vol. 5, Part 1: History of Agriculture in India (up to c. 1200 A.D.). D.P. Chattopadhyaya (Gen. ed.); L. Gopal and V.C. Srivastava (eds.): 48-69. New Delhi: Concept Publishing Company.

Pal, J.N., and M.C. Gupta 2005. Excavations at Hetapatti (Allahabad District): Some Preliminary Observations. *Journal of Interdisciplinary Studies in History and Archaeology* 2 (1): 163-68.

Pandey, J.N. 1990. Mesolithic in the Middle Ganga Valley. *Bulletin of the Deccan College Postgraduate and Research Institute* 49: 311-16.

Pant, P.C. 2001. Indus Civilisation versus Mahagara Neolithic Culture: A Note on Acculturation. *Puravritta* 1: 65-70.

Patterson, T.C. and C.E. Orser Jr, (eds.) 2004. *Foundations of Social Archaeology: Selected Writings of V. Gordon Childe*. Oxford: Berg.

Petraglia, M.D. and B. Allchin 2007. Human Evolution and Culture Change in the Indian Subcontinent. In *The Evolution and History of Human Populations in South Asia: Interdisciplinary*

Studies in Archaeology, Biological Anthropology, Linguistics and Genetics. M.D. Petraglia and B. Allchin (eds.): 1-20. Dordrecht: Kluwer Academic Publishers (Springer).

Pokharia, A.K., J.N. Pal, and A. Srivastava 2009. Plant Macro-Remains from Neolithic Jhusi in Ganga Plain: Evidence from Grain-based Agriculture. *Current Science* 97 (4): 564-72.

Possehl, G.L. and P.C. Rissman 1992. The Chronology of Prehistoric India: From Earliest Times to the Iron Age. In *Chronologies in Old World Archaeology*, 3rd edition, Vol. II, pp. 465-90 and 447-74. Chicago: University of Chicago Press.

Redman, C.L. (ed.) 1973. *Research and Theory in Current Archaeology*. New York: Wiley.

Reed, C.A. (ed.) 1977. *Origins of Agriculture*. The Hague: Mouton Publishers.

Salmon, M.H. 1982. *Philosophy and Archaeology*. New York: Academic Press.

Shanks, M. and C. Tilley 1987. *Re-Constructing Archaeology*. Cambridge: Cambridge University Press.

Sharma, G.R. 1965. Comments on 'Mesolithic Phase in the Prehistory of India'. In *Indian Prehistory – 1964*. V.N. Misra and M.S. Mate (eds.): 76-79. Poona: Deccan College.

Sharma, G.R. 1973. Mesolithic Lake Cultures in the Ganga Valley. *Proceedings of the Prehistoric Society* 39: 134-46.

Sharma, G.R. 1975. Seasonal Migrations and Lake Cultures in the Ganga Valley. In *K.C. Chattopadhyaya Memorial Volume*, pp. 1-20. Allahabad: University of Allahabad.

Sharma, G.R., V.D. Misra, D. Mandal, B.B. Misra, and J.N. Pal. 1980. *Beginnings of Agriculture*. Allahabad: Abinash Prakashan.

Sharma, G.R., and J.D. Clark (eds.). 1983. *Palaeoenvironments and Prehistory in the Middle Son Valley*. Allahabad: Abinash Prakashan.

Singh, Purushottam 1974. *Neolithic Cultures of Western Asia*. London: Seminar Press.

Singh, Purushottam 1990. *The Neolithic Origins*. Delhi: Agam Kala Prakashan.

Singh, Purushottam 2008. Origin of Agriculture in the Middle Ganga Plain. In *History of Science, Philosophy and Culture in Indian Civilization*, Vol. 5, Part 1: History of Agriculture in India (up to c. 1200 A.D.). D.P. Chattopadhyaya (Gen. ed.); L. Gopal and V.C. Srivastava (eds.): 3-18. New Delhi: Concept Publishing Company.

Tewari, R., R.K. Srivastava, K.K. Singh, K.S. Saraswat, I.B. Singh, M.S. Chauhan, A.K. Pokharia, A. Saxena, V. Prasad, and M. Sharma 2005-2006a. Second Preliminary Report of the Excavations at Lahuradewa District Sant Kabir Nagar, U.P.: 2002-2203-2204 and 205-06. *Pragdhara* 16: 35-68.

Tewari, R., R.K. Srivastava, K.K. Singh, and K.S. Saraswat 2005-2006b. Further Excavations at Lahuradewa, District Sant Kabir Nagar (U.P.) 2005-06: Preliminary Observations. *Puratattva* 36: 68-75.

Tewari, R., R.K. Srivastava, K.S. Saraswat, I.B. Singh, and K.K. Singh 2007-2008. Early Farming at Lahuradewa. *Pragdhara* 18: 348-73.

Torrence, R. 1983. Time Budgeting and Hunter-Gatherer Technology. In *Hunter-Gatherer Economy in Prehistory: A European Perspective*. G. Bailey (ed.): 11-23. Cambridge: Cambridge University Press.

Trigger, B.G. 1989. *A History of Archaeological Thought*. Cambridge: Cambridge University Press.

Varma, R.K. 1986. *The Mesolithic Age in Mirzapur*. Allahabad: Paramjyoti Prakashan.

Vishnu-Mittre 1972. Neolithic Plant Economy at Chirand, Bihar. *The Palaeobotanist* 21: 18-22.

Watson, P.J., S.A. LeBlanc and C.L. Redman 1971. *Explanation in Archaeology: An Explicitly Scientific Approach*. New York: Columbia University Press.

Williams, M.A.J., and K. Royce. 1982. Quaternary Geology of the Middle Son Valley, North-Central India: Implications for Prehistoric Archaeology. *Paleogeography, Paleoclimatology, Paleoecology* 38: 139-62.

Zvelebil, Marek 1986. Mesolithic Societies and the Transition to Farming: Problems of Time, Scale and Organisation. In *Hunters in Transition*. M. Zvelebil (ed.): 167-88. Cambridge: Cambridge University Press.

R.P. PANDEY

Late Quaternary Formations in the Ganga Valley

The Quaternary formation of the Ganga river is very rich and interesting. The river has yielded a thick blanket of alluvium, varying in nature and thickness. It is estimated to have a thickness of about 800 m below the present river level. In between these deposits, existed the water table in the Ganga plains. Prof. I.B. Singh (personal communication) of the Lucknow University has studied the alluviation of the Ganga plains and came to the conclusion that the thickness of the Ganga plains, many times is due to the tectonic activity. He has studied the exposed alluvial deposits. This is for the first time that the author has attempted to study the concealed alluvium and related environment in the Ganga plains. This has been possible only after recording of the bore-hole data.

The Ganga is a mighty, sacred and eastward flowing river of India which rises from Gangotri (Uttarakhand), India ($30^0$59N: $78^0$55E) and after traversing verities of land forms debouches in the Bay of Bengal. The major tributaries of Ganga are Yamuna, Gomti, Ramganga, Ghaghara, Mahakalia, Kosi, Gandak, Son and Mahananda. These rivers meeting each other have developed thick blanket of alluvium which is estimated some time 4000 to 8000 m at places. At Haridwar, the Ganga enters into the plains and heavy inflow of alluvium from hilly areas of Himalayas has caused alluviation in the Ganga valley (Allchin and Allchin 1996). The thickness goes on increasing from west to east and finally create Ganga delta at the Bay of Bengal. The total distance covered by the Ganga is about 2510 km. In fact, the alluviation in the Ganga plains is so thick that it is generally difficult to reach the basal rock.

Recently, the author has surveyed the Ganga plains between Kunda and Lalgopal Ganj with a view to trace the thickness of the alluviation, caused by the Ganga mainly on the left bank and see the lateral and vertical extension of the alluviation. About 50 bore-holes (borings) were examined which have given interesting results. The stratigraphy encountered through borings is as under.

The alluvial blanket in Ganga plains is too thick to allow reaching the bed rock. Several layers of water tables overlain and underlain by alluvium are recorded. An area of about 30 km on the left bank in the Doab of the Ganga-Duar is studied. Duar is a small left bank tributary of the Ganga having lateral extent of about 10-15 km and forms a Ganga-Duar Doab. The Doab was examined and alluvium stratigraphy was recorded which exhibiting about 115 ft thick alluviation. Below 115 ft, it was not possible to record as the water table was encountered (Fig. 1). The upper 10 ft is normal deposit of alluvium underlain by 10 ft thick *daldal* type of deposit. Below this was encountered 20 ft thick sandy deposit underlain again by the *daldal* deposit having thickness of about 20 ft. Between 60 to 70 ft a deposit of hardpan *kankar* was encountered and below it *kankar* nodular form of about 10 ft occur, followed by Ganga sand (whitish in colour) of about 15 ft underlain by 20 ft thick Yamuna sand (brown in colour). Below this was water table of high intensity. The total thickness of the alluvium of the Ganga-Duar Doab so far recorded is about 115 ft (Fig. 1).

In this area, several borings are done for getting water through pumping sets and tube wells. These borings were studied to get the concealed alluvial stratigraphy of the Ganga-Duar Doab in central Ganga plains, in particular and the complete Ganga plains in general.

The *daldal* deposit in the Ganga plains is regarded to belong to the Holocene. Earlier deposits indicate that during last phase of Pleistocene period, *kankar* formations took place. *Kankar* (calcretes) formation in the alluvial deposit is indicative of dry phase having less rainfall below 550 mm. The areas having less rainfall below 550 mm per annum develop hardpan *kankars* (Netterberg 1969; Pandey 1985, 1987) whereas areas receiving rainfall between 550-800 mm per annum develop kankarization in nodular forms. The areas receiving more than 800 mm rainfall per annum do not develop *kankar* formation. An average rainfall in the area under study is about 1000 mm per annum, therefore do not have scope of *kankar* formation in the Ganga valley. The kankarization indicate climatic change at the end of the Pleistocene and beginning of the Holocene. The occurrence of *kankar* deposit in nodular form earlier and deposition of hardpan at later stage do indicate dry phase and climatic change. Two cycles of *daldal* deposit and sandy deposit do indicate heavy rainfall in the beginning of Holocene and slowly shaping of modern landforms. The bore-hole data also indicates that the Yamuna has older depositional antiquity than those of the Ganga.

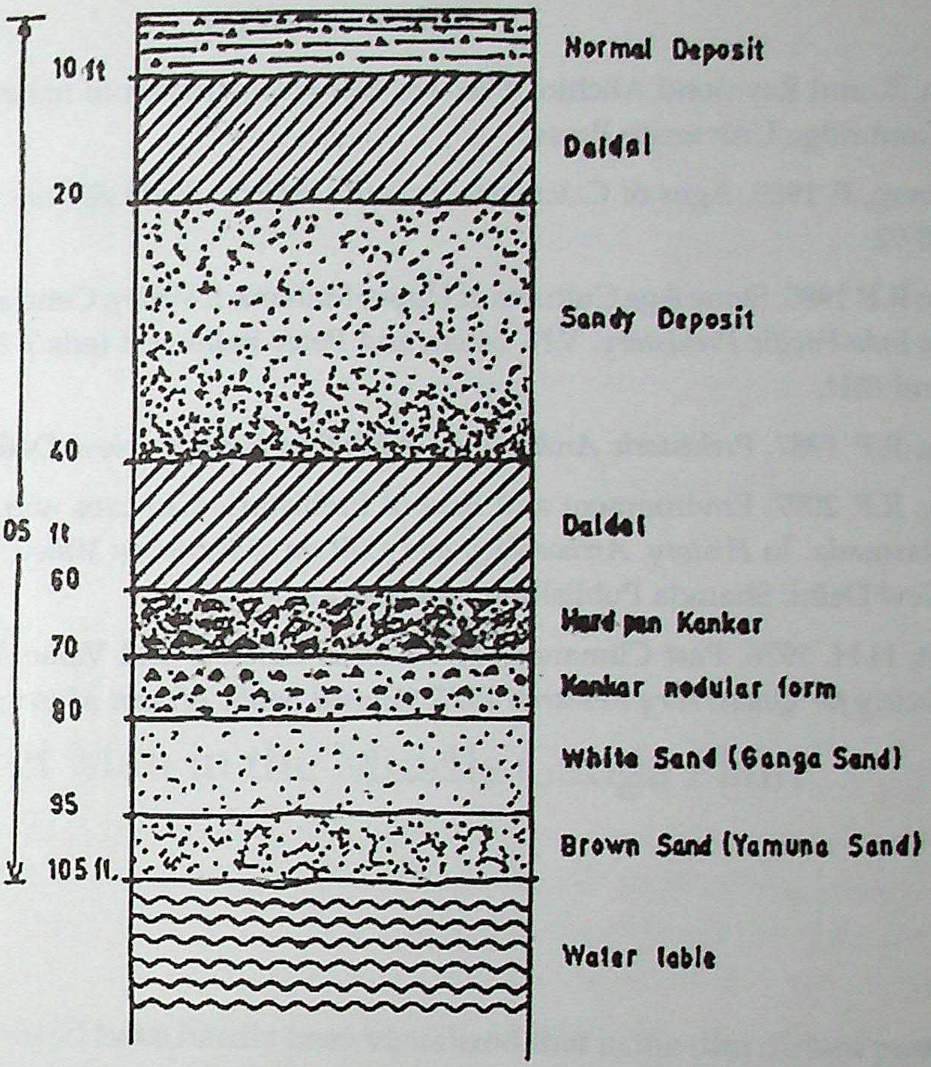

10 ft
20
40
05 ft
60
70
80
95
105 ft.
Normal Deposit
Daldal
Sandy Deposit
Daldal
Hard pan Kankar
Kankar nodular form
White Sand (Ganga Sand)
Brown Sand (Yamuna Sand)
Water table

Fig. 1. Quaternary stratigraphy of the Ganga valley

Conclusion

After examination the bore-hole data and the results coming up are interesting in this area. The Ganga has been regarded as older than that of the Yamuna. The brown sand having thickness of about 20 ft thick lie over the water table and is regarded as Yamuna sand. The white coloured sand, regarded as Ganga sand is found above the brown sand (having thickness of about 10 m), thus showing younger date.

The *kankars* are indicative of dry climate (60-80 ft) overlain by *daldal* and sandy deposit. The occurrence of kankary deposit below the *daldal* indicates the climatic variation. It seems that during the close of Pleistocene and beginning of Holocene, the Gangetic plain probably experienced a dry phase. In the beginning of Holocene, the climate became hot and due to melting of ice sheets of the Himalayas and heavy rains the Gangetic plain got covered with water sheets and due to heavy inflow of fine sand created *daldal* which is seen in boring section between 10-60 ft thickness.

BIBLIOGRAPHY

Allchin, B. and Raymond Allchin 1996. *The Rise of Civilization in India and Pakistan.* New Delhi: Cambridge University Press.

Netterberg, F. 1969. Ages of Calcreates in South Africa. *South African Archaeological Bulletin* 24: 88-92.

Pandey, R.P. 1985. Stone Age Cultures of Upper Mahanadi Valley, Central India. In *Recent Advances in Indo-Pacific Prehistory.* V.N. Misra and Peter Bellwood (eds.): 81-87. New Delhi: Oxford and IBH.

Pandey, R.P. 1987. *Prehistoric Archaeology of Madhya Pradesh.* New Delhi: Sundeep Prakashan.

Pandey, R.P. 2007. Environment and Rise of Prehistoric Cultures with Special Reference to the Narmada. In *History, Archaeology and Culture of Narmada Valley.* R.K. Sharma (ed.): 12-18. New Delhi: Sharada Publishing House.

Weinert, H.H. 1976. Past Climate Derived from Calcrete and Value. In *Proceedings 5th African Society for Quaternary Research 1975. Annual South African Museums* 71: 133-140.

V.D. Misra

Descent of Man in the Middle Ganga Plain

Five decades back it would have hardly been visualized that in the dim distant past, the middle Ganga valley had been inhabited by the Stone Age man. In this context it may be pointed out that explorations conducted by the Department of Ancient History, Culture & Archaeology, University of Allahabad over the last five decades have located more than 200 sites ranging from the late upper Palaeolithic to Mesolithic in Allahabad, Sant Ravidas Nagar, Varanasi, Jaunpur, Pratapgarh and Sultanpur districts (Sharma *et al.* 1980). The concerned sites are lying to the north of the Ganges. The area, explored so far, is bounded by the Ganga in the south and Gomti in the north. Of the explored sites, Sarai Nahar Rai (Sharma 1973: 129-44; 1975: 1-20; Misra 1977: 60-61), Mahadaha (Sharma *et al.* 1980; Misra *et al.* 2003: 1-37) and Wari Kalan Damdama (Varma *et al.* 1985: 45-65; Misra 1988: 59-64; Misra *et al.* 2003: 1-37), all lying in Pratapgarh district have been excavated by the Department of Ancient History, Culture & Archaeology, University of Allahabad. The excavations have furnished valuable data about the settlement pattern, burial practices, flora, fauna, bone objects, lithic technology, etc. of the Mesolithic culture.

The occurrence of microliths at various sites in the middle Ganga Plain is very significant when viewed in a geostratigraphic context. At places, the old alluvium – the *Bhagar* formation – is exposed up to a thickness of more than 10 m. This exposed horizon is composed of four units. At the bottom there is a yellowish concretionary and compact horizon. The second formation, containing small shell, is blackish in colour. Plastic clay constitutes the third formation while the fourth and the last unit is sandy and silty in character. Microliths are found distributed in the last unit suggesting thereby that when Stone Age man entered the Ganga plain, the last unit of the *Bhagar* was in the process of formation. Besides this, microliths are also found on the banks of horse-shoe lakes. These lakes constituted a distinct morphological feature of the middle Ganga Plain in general and that of Pratapgarh in particular. With the passage of time, though most of the lakes have either been filled up or are in the process of getting filled up through human agency, only a few lakes are still surviving. The area of the filled up lakes is very distinct from the surrounding area. Needless to say in the past these lakes were a perennial source of water. These also abounded in aquatic fauna and small game, and hence an ideal habitat for the Stone Age people.

As indicated earlier, the Stone Age sites of the middle Ganga Plain are divided into three groups on the basis of the use of raw material for manufacturing the artifacts, state of patination and the techno-typological consideration. These phases are – late upper Palaeolithic or Epipalaeolithic. Early Mesolithic (non-geometric) and early Mesolithic (Geometric) – (Pal 2002: 289-291).

The Epipalaeolithic phase is transitional from upper Palaeolithic to Mesolithic. This phase is represented by six sites – Mandah, Salhipur and Suleman Parvatpur in Pratapgarh; Kurha and Ahiri in Allahabad and Garhava in Varanasi districts. The artifacts of this phase are fashioned mostly on chert. The finished tools comprise retouched and backed blades, notches, points/drills, burins, scrapers and lunates. The unmodified waste is divisible into blades, flakes, cores core-rejuvenating flakes and chips. As the finished, unfinished tools and wastes are found together, it may be inferred that the tools were manufactured at the sites itself. Technologically speaking, these tools are larger and thicker in comparison to the tools of the succeeding phases. These are also marked by bold retouch.

From as many as 172 sites non-geometric microliths have been obtained. These artifacts are fashioned on chert, chalcedony, agate and carnelian. The assemblage comprises finished tools and unmodified waste. The tool types include blades, blunted backs, scrapers, burins, points and lunates. In comparison to the tools of the first phase, the tools of this phase are smaller and thinner.

The Early Mesolithic (Geometric) constitutes the third phase. This phase is represented at 21 sites. Unmodified waste and finished tools have been obtained from these sites. The assemblage is marked by the geometric shapes, *i.e.*, triangle or trapeze or both. The size of the tools of this phase is further reduced. At the sites of this phase there is pre-ponderance of chalcedony elements. The tools are precisely made and minutely retouched. All the excavated sites of the middle Ganga Plain, *i.e.*, Sarai Nahar Rai, Mahadaha and Wari Kalan Damdama belong to this group.

The Excavated Sites

The Department of Ancient History, Culture & Archaeology, University of Allahabad conducted excavations at three Mesolithic sites: Sarai Nahar Rai, Mahadaha and Wari Kalan Damdama, all located on the banks of horse-shoe lakes. Sarai Nahar Rai measuring 1800 sq m was excavated for two seasons 1970-71 and 1971-72, Mahadaha measuring 8000 sq m again for two seasons – 1977-78 and 1978-79 and Wari Kalan Damdama measuring 8750 sq m for five seasons, *i.e.*, 1982-83-1986-87. While at Sarai Nahar Rai and Mahadaha microliths were found up to a depth of 6 cm and 60 cm respectively, at Wari Kalan Damdama the maximum occupational thickness of 1.5 m was recorded. The excavations conducted at these sites have furnished valuable data not only about the burial practices, but about hearths, flora, fauna, bone tools, ornaments, etc. as well. In the following pages, these features are detailed.

Burials

At Sarai Nahar Rai (Kennedy *et al*. 1986) as many as 11 graves, all oval and shallow, were opened. Of these 10 graves were found containing skeletal remains of single – individual male or female. From one grave, however, the skeletal remains of as many as four individuals were obtained – two males and two females, the females lying to the left. All the graves were west-east oriented, the head lying in the west. Of the two hands, one was found placed on the abdomen while the other along the body. At Mahadaha (Kennedy *et al*. 1992) 28 graves were exposed. Of these two yielded double burials. A few skeletons at the site were found wearing ornaments-earrings, necklace and pendants made of bone or antler. From this site the skeletal remains of male, female and child were found. With a few exceptions, the skeletons were found extended west-east as was the case at Sarai Nahar Rai. At Wari Kalan Damdama as many as 41 graves were exposed. Of these 35 graves contained skeletal remains of single individuals, while from 5 graves double burials were obtained (Pal 1988: 115-22; Pal 1992: 35-44). Of the double burials in four cases, the skeletal remains of a male and a female were found, the male being placed on the right side. From one grave at the site skeletal remains of three individuals – two males and one female were found. Of the 48 skeletons exposed at the site orientation could be worked out in 46 cases. 34 skeletons were extended west-east, four east-west, six north-south and two south-north.

The skeletal remains obtained from the excavated sites represent robust and tall individuals with sturdy features.

Hearths

The pit-hearths constitute one of the important features of the excavated Mesolithic sites of the middle Ganga plain. Even before excavation their identity could be easily discerned, as these were marked by the presence of burnt clay lumps. As Sarai Nahar Rai, Mahadaha and Wari Kalan Damdama as many as 8, 35 and 32 pit-hearths were exposed. Oval or circular in shape, these hearths contained animal bones, charred or uncharred, burnt clay lumps and ash. From none of the hearths charcoal was found. Similarly human bones were not obtained from any of the hearths, thus excluding the possibility of the practice of cannibalism in the given society. These hearths could be divided into two groups – ordinary and plastered one, the latter being plastered with thick clay solution. Sometimes more than one coating of clay has been used for plastering the pit. As per evidence, some pit-hearths were used again and again.

Floors

The excavations at Sarai Nahar Rai and Wari Kalan Damdama have brought to light floors as well. At Sarai Nahar Rai the floor was enclosed by four post-holes. The area enclosed by these post-holes was subsequently covered by a circular floor paved with burnt clay lumps probably collected from pit-hearths. From this floor were collected plenty of microliths – cores, flakes and finished tools – along with animal bones. Excavations at Damdama exposed circular or semi-circular burnt plastered floors, some of which with multiple layers of burnt plaster. Such plastered floors are associated with habitational areas. On these plastered floors were found hearths, and charred animal bones along with microliths. In this connection it may be pointed out that in the Vindhyan area, the Mesolithic people could take shelter in the rock-shelters abounding in the area during rains, winter and hot seasons. But in the Ganga plain, where natural shelters were not available, the Mesolithic people might have felt necessity of artificial construction to protect themselves from inclement weather. Necessity is the mother of invention. The hutments were needed to meet the requirements in new setting in which the Mesolithic people had landed themselves in the middle Ganga Plain.

Fauna

Both explorations and excavations at Sarai Nahar Rai, Mahadaha (Joglekar *et al*. 2003: 38-119) and Wari Kalan Damdama (Thomas *et al*. 1995: 29-36; 1996: 255-266; 2002: 366-80) have brought to light a corpus of animal bones. Besides exploration, these bones have been obtained from hearths, floors, butchering area and lake area (Mahadaha). The species identified include cattle, bos gauras, wild buffalo, *Nilgai*, wild goat, *Chital*, hog-deer, *Samphar*, *Chowsingha*, black buck, *Chinkara*, wild pig, rhinoceros, elephant, hippopotamus, wolf, jackal, tiger, sloth-bear, etc. Among the aquatic creatures, bones of fishes and tortoise have also been found in good number. Bones of birds are also available. These bones, needless to say, throw welcome light on the range of animals, aquatic creatures and birds available in the area when the Mesolithic man entered the middle Ganga Plain. The available faunal data also furnishes welcome information about the contemporary climatic condition. The presence of elephant, rhinoceros and possibly hippopotamus would suggest a wetter climatic condition prevailing in the area. The horse-shoe lakes abounded in aquatic creatures. All the animals belong to the wild category (Chattopadhyaya 2002: 381-400).

Flora

The excavations have yielded charred millet-hike grain, charcoal fragments and charred seeds of *ber*. The area abounded in grasses the grains of some of them were edible. In this connection it may be pointed out that the occurrence of food-processing equipments like querns, mullers, etc. at the excavated sites in sizable number would indicate that besides hunting, catching and fishing, the consumption of wild edible grain also played a significant role in the life of the people. The excavated Mesolithic sites of the Belan and Son valleys have also yielded parallel evidence. In this connection, particular mention may be made of Chopani-Mando (Sharma and Misra 1980) on the one hand and of Baghor II (Sussman *et al*. 2000 (reprint): 161-96), Dhanuhi (Sinha, personal communication), Banki (Misra *et al*. 1992-93: 5-10) Medhuli (*IAR* 1982-83: 57-58), and Ghagharia (Brandt *et al*. 2000 (reprint): 2005-239).

Tools and Weapons

Both surface explorations and excavations at these sites have resulted in the discovery of good crop of tools and weapons fashioned on stone and bone. As indicated earlier, the food-processing equipments like quern, muller along with hammer stones, sharpeners, anvils, etc. made of quartzite and sandstone have been found in good number from these sites. The microlithic assemblage represented at the sites include cores, flakes, debitage and finished tools fashioned on chert, chalcedony, agate, carnelian, quartz, etc. The finished tools comprise retouched, utilized, backed and truncated blades, points, percoir, drills, scalene and isosceles triangles, trapezes, lunates, tranchets, scrapers, etc. The industry exhibits an excellent workmanship. Reduced size of tools, their limited number and the presence of exhaust cores not only indicate the scarcity of the raw material but also point towards the maximum utilization of the available material. One can appreciate the problem of the Mesolithic folk in the middle Ganga Plain when one visualizes the fact that for manufacturing stone objects whether food-processing equipments or microliths, the supply-line of the requisite raw material was depending on the Vindhyan region lying at a distance more than 100 km to the south.

On the basis of microwear analysis of the some of tools of the excavated sites (Pal 2002: 313-26), it has been inferred that these tools were used for scrapping, sawing, cutting, drilling, incising, grooving, etc. Among the tentative contact material mention may be made of hide, dry hide, meat, soft plant, green grass, green reed, dry reed, green wood, dry wood, fresh bone, dry bone and antler.

The excavations conducted at Mahadaha and Wari Kalan Damdama have yielded a corpus of bone implements (Gupta 2002: 306-12). From Mahadaha as many as 45 bone implements have been recorded. These include arrow heads, points, blades, chisels, knives, scrapers, etc. Arrowheads are generally made from split long bone or horn core and subsequently rubbed all around with both the ends sharpened. Points were manufactured in the same technique. These are generally made of small-sized horn-core of deer, antelope, and stag. Some unfinished implements in different stages of manufacture have also been found indicating thereby that the implements in question were locally manufactured. The excavation at Wari Kalan Damdama has also yielded rich crop of bone tools. Bone arrowheads, obtained from the site, exhibit a high workmanship of the Mesolithic people. The concerned arrowheads are usually circular or oval in cross-section with one of the ends sharpened by rubbing or grinding. It is thicker towards the proximal end and in the centre while tapering towards the distal end. The available evidence suggests that long bones and horn cores have also been used as tools probably for digging or engraving. Most of the bone objects found at the site are made of charred or semi-charred bone pieces.

The bone implements found in good number at the excavated Mesolithic sites – Mahadaha and Wari Kalan Damdama constitute a significant chapter in the history of the Mesolithic culture in India. It may be treated as regional variable. In this connection it may be pointed out that the occurrence of the bone implements at the Mesolithic sites of the Belan and Son valleys or elsewhere is rare. It demonstrates how the Mesolithic people in the middle Ganga Plain were responding in their new geographical setting. In the absence of stone in the area they started using its substitute.

Bone Ornaments

Excavations at Mahadaha and Wari Kalan Damdama have brought to light bone ornaments both in finished and unfinished forms. The excavation at Mahadaha yielded twenty six bone ornaments – eighteen finished and eight unfinished. All these are fashioned on antler. The finished ornaments included earring and necklace, the latter consisting of eleven small rings was found around the neck of an individual. Form the butchering-cum-manufacturing area of Mahadaha have been found a good number of antler with incision and cut-marks. Some of the pieces were polished and rubbed from all sides. The available evidence suggests that rings were made out of the antler through incision and subsequently these were used in various types of ornaments. From Wari Kalan Damdama bone ornaments were found both from surface exploration and excavations. These are found fashioned on bone and ivory. Two pendants, one finished bone bead, one piece of bangle and one typical objects with two perforations on its two ends merit attention. The two pendants are made on thick flat pieces of bone. These pieces have black shining surfaces and have a hole in each of them for getting suspended through a string. A bone ornament with semi-circular marks on one side has also been obtained. The occurrence of bone ornaments at the Mesolithic sites of Mahadaha and Wari Kalan Damdama enables us to peep into the aesthetic sense of the Mesolithic people in that dim distant past. Even though leading a hunting-gathering way of life man was not devoid of aesthetic sense otherwise it would be difficult to explain the occurrence of beads, necklace, pendants and bangles at these sites.

Chronology

For computing the chronology of the late upper Palaeolithic culture of the middle Ganga Plain, it may be pointed out that in the area under discussion the late upper Palaeolithic tools are found in geological context, *i.e.*, the last unit of the *Bhagar* (old alluvium) or the top of the underlying unit, *i.e.*, the plastic clay, suggesting thereby that when these Stone Age people entered the Gangetic Plain the old alluvium (*Bhagar*) was in the process of formation. Besides this geological evidence indicating a high antiquity of the culture concerned a few radiocarbon dates obtained from the upper Palaeolithic/Epipalaeolithic horizon from the Belan and the Son valleys deserve attention. Gravel III, the upper Palaeolithic horizon in the Belan valley, has yielded two dates reading 17785±330 BC and 23870±870-730 BC. As many as five dates have been obtained from gravel IV at Mahagara again in the Belan valley. These dates read 8080±115 BC, 8175±160 BC, 9360±190 BC, 9945±180 BC and 12200±400-300 BC (Possehl and Rissman 1992: 460, Table 2). Two dates obtained from Rampur (Raju and Venkatasubbaiah 2002: 102), a late upper Palaeolithic site in Sidhi district in the Son valley, read 9920±120 BC and 24300±40 BC. Pal *et al*. (2004: 62, Table 4) have placed the late upper Palaeolithic/Epipalaeolithic culture of the Belan and Son valleys within a range of 20000 to 16000 BC on the basis of Infra Red stimulated Luminescence Ages. In the light of these dates, the late upper Palaeolithic phase in the middle Ganga Plain may provisionally be placed within a date bracket ranging from 17000 BC to 10,000 BC.

For computing the chronology of the Mesolithic culture in the middle Ganga Plain the following points deserve attention:

I. That the microliths in the area, under discussion, are found in geological context, *i.e.*, the last unit of the *Bhagar* formation.

II. That the animal bones obtained from the excavated Mesolithic sites include bones of elephant, rhinoceros and possibly hippopotamus, suggesting thereby a slight humid climatic condition at the arrival of the Mesolithic man in the area.

III. All the animal bones belong to wild fauna. The domestication of animal had yet to set in.

IV. The Mesolithic people of the middle Ganga Plain were not using pottery, even the hand-made one.

V. That the presence of the fragments of querns and mullers at the excavated sites would suggest that gathering of wild edible grains was an occupation among the Mesolithic people otherwise the presence of food-processing equipments at these sites could hardly be explained in the present state of our knowledge.

The combined testimony of the above points would indicate that microliths and other archaeologically associated artifacts would place the Mesolithic culture of the middle Ganga

Plain in the Mesolithic context. In the light of the excavations conducted at Chopani-Mando (Sharma and Misra 1980) in the Belan valley in Allahabad, Lekhahia (Misra 1977) in Mirzapur and Baghor II (Sharma *et al*. 1980), Banki (Misra *et al*. 1992-93: 5-10), Medhauli (*IAR* 1982-83), Dhanuhi (Sinha, personal communication), etc., the Mesolithic phase represented in the middle Ganga Plain may be placed in pre-pottery geometric phase.

A few ^{14}C/thermoluminiscent dates have also been obtained from some of the excavated sites. A ^{14}C date obtained from Sarai Nahar Rai (Possehl and Rissman 1992: 461) reads 8395±110 BC. A thermoluminiscent date from Damdama (Wari Kalan) ranges from 7000 BC to 5000 BC (Lucacs *et al*. 1996: 301-311). Two AMS ^{14}C dates from Damdama read 6690±65 BC and 6915±65 BC. Supportive evidence indicating the high antiquity of the Mesolithic culture of the middle Ganga valley has also been obtained from the adjoining Vindhyan area as well. Two AMS ^{14}C dates obtained from Lekhahia Rock-Shelter (Mirzapur district) read 6420±75 BC and 6050±75 BC. Baghar II (Sidhi district, Madhya Pradesh) has yielded a date reading 6380 BC (Possehl and Rissman 1992: 461). From Adamgarh (Possehl and Rissman 1992: 461) and Barkhera (Possehl and Rissman 1992: 461, Table 3), both in Madhya Pradesh, dates obtained read 5505 BC and 5520 BC respectively. From the Mesolithic Paisara (Bihar) a radiocarbon date reading 7420±110 BC has been obtained (Lucacs *et al*. 1996: 301-11). Recently, Pal *et al*. (2004) in an illuminating article have proposed a time-bracket of 10000-8000 BP for the Mesolithic culture of the Belan and Son valleys on the basis of infrared stimulated Luminescence Ages (Pal *et al*. 2004: 51-62).

In the light of the above the beginning of the Mesolithic culture of the middle Ganga Plain may be placed in the early phase of the Holocene if not at the fagend of the Pleistocene. Such antiquity of the Mesolithic culture in India may not surprise us any more when viewed against the occurrence of microliths in Sri Lanka in the late Pleistocene deposits (Kennedy and Elgart 1998).

Origins

For considering the origin of the Mesolithic culture in the middle Ganga Plain one has to take the following points into consideration:

I. That in the north-central India, both in the valley of the Belan and the Son, the sequence of the Stone Age cultures is documented right from the lower Palaeolithic to the Neolithic almost without interruption. The artifacts are found in geological context along with animal fossils.

II. For manufacturing the stone tools in different phases the requisite raw material was available in the Vindhyan region. In this connection it may be pointed out that in the Vindhyan area at places such spots are located and well-documented where Stone Age man used to manufacture tools. Such sites are designated as factory sites in archaeological parlance. Cores, debitage and finished artifacts all have been found from such sites.

III. As per the available archaeological record, the earliest Stone Age culture in the middle Ganga Plain may be ascribed to the late upper Palaeolithic phase. The artifacts pertaining to the lower, middle and upper Palaeolithic phases have not been recorded from any of the sites in the middle Ganga Plain so far.

IV. The middle Ganga Plain is devoid of stone from which artifacts could be produced. As such the late upper Palaeolithic man might have entered the Middle Ganga Plain from an area which abounded in stone out of which artifacts could be produced. Not only this, the incoming man was equipped with requisite technology with the help of which stone tools could be produced. It has aptly been remarked that for understanding the genesis of steam engine one has to look to the kettle of James Watt. The late upper Palaeolithic man entered the middle Ganga Plain from an area where stone was available and where man was equipped with the stone technology. Viewed against this background the Vindhyan area appears to be the spring board from where the Stone Age man in the late upper Palaeolithic phase entered the middle Ganga Plain. A comparative study of the chert artifacts from the sites of the Vindhyan area on the one hand and those of the middle Ganga Plain on the other, give interesting reading. For example, the Mesolithic sites of Baira Dumuhawan in Chakia sub-division of Chandauli district and Garwa, a Mesolithic site to the north of the Ganga in Varanasi district, have yielded microliths fashioned on identical black chert. Similarly, the cherty stuff found at the Mesolithic sites of Allahabad and Pratapgarh districts are almost identical with those found from the Mesolithic sites in the Vindhyan area in the south in Allahabad district. All these factors put together strongly indicate that during the terminal Pleistocene datable between 17000 to 10000 BC, a band of the late upper Palaeolithic hunters and gatherers started moving from the Vindhyan area towards the north to the Ganga Valley. It is not unlikely that in the beginning this might have been a seasonal migration, but with the passage of time they became permanent settlers in northern Allahabad, Sant Ravidas Nagar, Varanasi, Jaunpur, Pratapgarh and Sultanpur districts. It is argued that pressure of population and growing aridity in the Vindhyan region might have induced some hunter-gatherers to move to the north. In this connection, the curiosity of man to move to an unknown land might also have played some role, otherwise we can not explain the migration of a band of Stone Age people from Siberia to America in the terminal Pleistocene (Clark and Piggott 1970: 89-104).

BIBLIOGRAPHY

Brandt, S.A., J.D. Clark, J.A. Gutin and B.B. Misra 2000 (reprint). Rock-shelters with Paintings on the top of the Kaimur Escarpment at Ghagharia and an Assessment of the Excavations and Analysis of the Mesolithic Occupants at the Ghagharia I Shelter. In *Palaeoenvironments and Prehistory in the Middle Son Valley, Madhya Pradesh, North Central India*. G.R. Sharma and J.D. Clark (eds.): 205-39. Allahabad: University of Allahabad.

Chattopadhyaya, U.C. 2002. Mesolithic Fauna of India with Special Reference to the Central Ganga valley. In *Mesolithic India.* V.D. Misra and J.N. Pal (eds.): 381-400. Allahabad: University of Allahabad.

Clark, G. and Stuart Piggott 1970. *Prehistoric Societies.* Pelican.

Gupta, M.C. 2002. Mesolithic Bone objects of the Middle Gangetic Plain. In *Mesolithic India.* V.D. Misra and J.N. Pal (eds.): 381-400. Allahabad: University of Allahabad.

Jogelkar, P.P., V.D. Misra, J.N. Pal and M.C. Gupta 2003. *Mesolithic Mahadaha: The Faunal Remains.* Allahabad: University of Allahabad.

Kennedy, K.A.R., N.C. Lovell and C.B. Burrow 1986. *Mesolithic Human Remains from the Gangetic Plain: Sarai Nahar Rai.* Ithaca: Cornel University.

Kennedy, K.A.R. and A.A. Elgart 1998. South Asia: India and Sri Lanka. In *Huminid Remains: An update* 8: 1-95. (eds. R. Orban and P. Semal) Brussels: *Anthropologic & Prehistoirie Institute Royal des Sciences Naturelles de Belgigue.*

Kennedy, K.A.R., J.R. Lucacs, R.F. Pastor, L.T. Johnston, N.C. Lovell, J.N. Pal, B.E. Hemphil and C.B. Burrow 1992. *Human Skeletal Remains from Mahadaha: A Gangetic Mesolithic Site.* Ithaca: Cornel University.

Lucacs, J.R. and J.N. Pal 1993. Mesolithic Subsistence in North India: Inferences from Dental Attributes. *Current Anthropology* 34 (5): 745-65.

Lucacs, J.R., J.N. Pal and V.D. Misra 1996. Chronology and Diet in Mesolithic North India: Preliminary Report of New AMS C^{14} dates, δ-C^{13} Isotope Values and their significance. In *Bioarchaeology of Mesolithic India: An Integrated Approach,* XXXIII Colloquium of the International Congress of Prehistoric and Proto-historic Sciences. G.E. Afanas'ev, S. Cleuziou and J.R. Lucacs (eds.): 16 (23): 301-311. Forli: ABACO Edizioni.

Misra, V.D. 1977. *Some Aspects of Indian Archaeology.* Allahabad: Prabhat Prakashan.

Misra, V.D. 1988. Excavations at Damdama (Wari Kalan), Pratapgarh District, U.P. *Bulletin of Museum and Archaeology* 41-42: 59-63. Lucknow: State Museum, Lucknow.

Misra, V.D., B.B. Misra, U.C. Chattopadhyaya, D.K. Shukla and Prakash Sinha 1992-93. Excavations at the Primary Context Mesolithic Occupation Site at Banki, District Sidhi, Madhya Pradesh: A Preliminary Report. *Pragdhara* 3: 5-10.

Misra, V.D., J.N. Pal and M.C. Gupta 2003. Excavations at Damdama. In *Mesolithic Damdama: Dental Histology and Age Estimation.* Gwen Robbins, V.D. Misra, J.N. Pal and M.C. Gupta (eds.): 1-32. Allahabad: University of Allahabad.

Pal, J.N. 1992. Mesolithic Human Burials in the Gangetic Plain, North India. *Man and Environment* XVII (2): 35-44.

Pal, J.N. 1998. Mesolithic Double Burials from Recent Excavations at Damdama. *Man and Environment* XII: 115-122.

Pal, J.N. 2002. Subsistence Activities among the Mesolithic People of North India as Revealed by Microwear Studies of Microliths. In *Mesolithic India.* V.D. Misra and J.N. Pal (eds.): 313-326. Allahabad: University of Allahabad.

Pal, J.N., M.A.J. Williams, M. Jaiswal and A.K. Singhvi 2004. Infra Red Stimulated Luminescence Ages for Prehistoric cultures in the Son and Belan Valleys, North Central India. *Journal of Interdisciplinary Studies in History and Archaeology* I (2): 51-62. Allahabad: University of Allahabad.

Possehl, G.L. and P.C. Rissman 1992. The Chronology of Prehistoric India: From Earliest Times to Iron Age. In *Chronology in Old World Archaeology.* R.W. Ehrich (ed.). Vol. I: 465-90; Vol. II: 447-74. Chicago and London: University of Chicago Press.

Raju, D.R. and P.C. Venkatasubbaiah 2002. The Archaeology of the Upper Palaeolithic Phase in India. In *Indian Archaeology in Retrospect - Prehistory (Archaeology of South Asia)*, Vol. I. S. Settar and Ravi Korisettar (eds.): 85-109. New Delhi: Indian Council of Historical Research.

Sharma, G.R. 1973. Mesolithic Lake Culture in the Ganga Valley. *Proceedings of the Prehistoric Society* 39: 129-44.

Sharma, G.R. 1975. Seasonal Migration and Mesolithic Lake Cultures of the Ganga Valley. In *K.C. Chattopadhyaya Memorial Volume*: 1-20. Allahabad: University of Allahabad.

Sharma, G.R. and B.B. Mishra 1980. *Excavations at Chopani-Mando*. Allahabad: Abinash Prakashan.

Sharma, G.R., V.D. Misra and J.N. Pal 1980. *Excavations at Mahadaha*. Allahabad: Abinash Prakashan.

Sinha, Prakash 1996. Personal Communication.

Sussman, C.R. Blumenschine, J.D. Clark and B.B. Misra 2000 (reprint). Preliminary Report on Excavations at Mesolithic Occupation Site at Baghor II Locality. In *Palaeoenvironments and Prehistory in the Middle Son Valley. Madhya Pradesh, North Central India*. G.R. Sharma and J.D. Clark (eds.): 161-96. Allahabad: University of Allahabad.

Thomas, P.K., P.P. Joglekar, V.D. Misra, J.N. Pandey and J.N. Pal 1995. A Preliminary Report of the Faunal Remains from Damdama. *Man and Environment* XX (1): 29-36.

Thomas, P.K., P.P. Joglekar, V.D. Misra, J.N. Pandey and J.N. Pal 1996. Faunal Evidence for the Mesolithic Food Economy of the Gangetic Plain with Special Reference to Damdama. In *Bioarchaeology of Mesolithic India: An Integrated Approach*, Colloquium XXXIII of the International Union of Prehistoric and Protohistoric Sciences. G.E. Afanas'ev, S. Cleuziou, J.R. Lucacs and M. Tosi (eds.): 255-66. Forli: ABACO Edizioni.

Thomas, P.K., P.P. Joglekar, V.D. Misra, J.N. Pandey and J.N. Pal 2002. Faunal Remains from Damdama: Evidence for the Mesolithic Food Economy of the Gangetic Plain. In *Mesolithic India.* V.D. Misra and J.N. Pal (eds.): 366-380. Allahabad: University of Allahabad.

Varma, R.K., V.D. Misra, J.N. Pandey and J.N. Pal 1985. A Preliminary Report at the Excavations at Damdama. *Man and Environment* IX:45-65.

M.D.N. SAHI

Neolithic Culture of the Ganga Valley: A New Perspective

K.A.R. Kennedy (2002: 76) holds that the Indian Mesolithic was a dynamic cultural achievement of art and exploitation of new ecological settings that sets it apart from pre-historic elements in other parts of the world. According to him neither an African nor European model is applicable to pre-historic events in South Asia. Supporting the above view the present author intends to demonstrate here further that except that of the Kashmir Valley (Sharma 1991) even the West Asian Neolithic model is not applicable to South Asian situations particularly to the Ganga Valley. For this purpose a fresh assessment of all the diagnostic traits usually associated with the Neolithic culture of the Ganga Valley on a different parameter becomes imperative. At the same time certain problems have been posed. This is what has been attempted in this paper.

Introduction

In the modern archaeological literature the historical age determining terminologies like Palaeolithic, Mesolithic, Neolithic and Chalcolithic represent well defined successive stages in lineal mode of cultural evolution and development. These terms are mainly based on respective tool manufacturing techniques and their typology and not on the subsistence economy of the people of these respective periods. It was the discovery of ground jadite celt which induced Sir John Lubbock (1865) to coin the term 'Neolithic' to denote an age in which stone implements are more skillfully made, more varied in form and often polished. Accepting this definition Burkitt

(1955: 244) added three more characteristics to this period. These were: practice of agriculture, domestication of animals and pottery manufacturing besides grinding and polishing of stone tools. It was also generally believed that existence of such a cultural complex prior to the introduction of metal (copper) in the region was also necessary for identification of a true Neolithic site (Krishnaswami 1962).

Childe (1951) formulated the hypothesis of Neolithic Revolution on the basis of materialistic comprehension of history. Dubbing Childe's Neolithic Revolution as 'propinquity theory' Braidwood (1960) followed up the development of this cultural process by substituting a new model of 'Natural Habitat Zone Theory' for Potential Domesticates. He rejected terms like Epipalaeolithic, Mesolithic, Neolithic, Chalcolithic etc. as having far too scattered a variety of meanings to make them useful for serious exchange of ideas. He introduced Sub-Era of Incipient Cultivation and Domestication of Animals leading through Final Era of Hunting – Collecting to the Primary Sub-Era of Effective Village Farming Communities (Braidwood 1959: 103; 1983). This model is purely based on subsistence economy of the then people and not on their tool technology and typology. These classifications of cultural periods based on different models do not tend to run concurrently.

According to Thapar (1974: 60) the application of the Neolithic 'has to be confined to that stage of human development which is characterized by (a) the systematic exploitation of the natural resources in animals and plants, and the shifts in basic patterns more stimulating to man's creative and intellectual capacity, and (b) increasing tendency to settle more or less permanently in the open or to make seasonal migrations to potential areas'. But now these characteristics are very well attested in the archaeological records of the Mesolithic and Advanced Mesolithic periods at sites of Central Gangetic Valley, Gujarat and Rajasthan.

Singh (1974; 1985: 58) on the basis of his study of the West Asian Neolithic Cultures held that of the former four classic criteria of Burkitt, the manufacture of pottery and the grinding and polishing of stone tools are no longer valid today. He further observes that the cultivation of cereal plants and domestication of animals are the only two criteria by which a culture could be designated as Neolithic. He, however, concedes that recent researches in Levant shows that even these two criteria seem to have an earlier beginning. In fact such a hypothesis tends to extend the chronological and cultural bracket of the Neolithic Culture backwards, encompassing the Epipalaeolithic and Mesolithic periods within its fold and ignores the inherent technological nature of the term 'Neolithic' itself. Moore (1982: 232) clearly admitted that 'most of the changes hitherto regarded as characteristics of the earlier stages of the Neolithic took place during the Epipalaeolithic'. Such a conception has also necessitated the use of terms like 'proto-Neolithic' 'pre-ceramic Neolithic' etc. about which Masson and Sarianidi (1977: 26) held that: 'It seems, however, that these substitutes for the traditional and in many cases rather convenient terminology, are by no means the most rational when it comes to historical periodisation'. Kennedy (2002: 77) is not in favour of abandoning presently the pre-historical 'periods' since they serve to define widely held perceptions of pre-historic life ways indicating distinct ancient cultural developments. Therefore, for the determination of the place of Neolithic period in over all historical evolutionary process deletion of ground stone celts as one of its essential criteria may not be a sound and logical proposition (Sahi 1985; 1994). The retention of these terminologies is also necessary from the point of view of traditional Indian historical reconstructions classified into "periods" and their uniformity, in different narratives.

For designating the Neolithic cultural period it may not be logical to use the term 'Early Farming Phase' synonymously or as a substitution for Neolithic (Tewari *et al*. 2003: 38) as the former term does not serve the purpose of defining widely held views and perceptions of a distinct Neolithic cultural Phase, attesting not the beginning but an advanced stage of farming in Indian context. The perception of 'Early Farming Phase' in India varies from site to site and region to region. The term is also used very vaguely. To illustrate, it may be pointed out that the Chalcolithic people of Malwa and Jorwe cultures of Western India are found mentioned as 'Early Farming Communities' (Dhavalikar and Possehl 1974: 39) whereas the term 'Early Farming Communities' has also been used for people of different cultural periods falling between 9th-4th millennium BC (Mani 2005: 7-20). Again the term is used for the Chalcolithic people of Kayatha, Ahar and Malwa cultures (Dhavalikar 2002). Many such examples may be cited.

Recent researches in South Asia also tend to indicate that the domestication of animals and cultivation of cereal plants have an earlier beginning, going back to Mesolithic/Advance Mesolithic times. In western India bones of domesticated animals were reported from several Mesolithic sites like Ganeshwar I (*IAR* 1983-84: 72) and Tilwara (Misra 1973a) in Rajasthan and Loteshwar, Ratanpura, Dhansura, Kanewal etc. in Gujarat (Sonawane 2002:125), Bhimbetka and Adamgarh caves in Madhya Pradesh. Such bones of domesticated animals continue to occur in Advance Mesolithic levels at Langhnaj (Sankalia 1965) and Bagor (Misra 1973b). In a palynological study conducted (Gurdip Singh *et al*. 1974) in Rajasthan lakes of Lunkaransar, Didwana and Sambhar, the occurrence of cerealia type of pollen grains are reported along with abundance of bits of charcoal pieces. From Bagor Phase II perforated mace-head is reported which is often interpreted as weights of digging sticks used in primitive agriculture. This has led Misra (1973b) to conclude that this constellation of material traits at Bagor is otherwise known only from sites where agriculture is established as a certainty.

The evidence from sites like Ganeshwar, Bagor, Loteshwar and Langhnaj further demonstrate clearly that there was a direct transformation of the Mesolithic culture through Advance Mesolithic to Chalcolithic cultural phase without any Neolithic interlude.

The Beginning of Copper Technology

The Mesolithic people were the first innovators of pyrotechnology when they started giving heat treatment to the cobbles of semi-precious stones (Varma 2002: 351) like chert agate, quartz etc. for better flaking quality in the manufacturing process of microliths. Subsequently, this technology gave rise to the production of pottery and other terracotta objects which marks the advent of Advanced Mesolithic Period.

It is quite likely that the same technology may have given rise to copper technology, if in the process some copper ore chunks (Chalcopyrite) got heated as well. However, the event must have taken place only during the later phase of the Advanced Mesolithic period on the present showing. Copper has been reported at the Advanced Mesolithic levels of Mehrgarh IB and Bagor II datable between 4500 BC and 4000 BC respectively. At none of these sites local copper producing industry is attested. However, triangular barbed arrow heads from Bagor suggested that they could have been derived from Ganeshwar where large scale local industry is attested producing similar objects. Concentration of Ganeshwar culture sites in the Khetri belt of the Aravallis yielding not only copper objects but chunks of ore and heaps of slag strengthen our contention.

The present author (Sahi 2005: 94) has demonstrated that the Advanced Mesolithic ceramic complex of Bagor and Ganeshwar comprising ochrous red ware bearing incised designs on the outer surface but without painting was the precursor of that of the subsequent Hakra - Ganeshwar-OCP - Copper Hoard culture, characterized by the introduction of painting in black over red surface and graffiti marks resembling the signs of the Harappan script, datable between 3700 BC and 3000 BC (Sahi 2006). But recently three dates coming from Bhirrana, a Hakra ware site in Haryana viz. BS-2314 : 4770 BC; BS-2318 : 5336 BC and BS-2333 : 6647 BC (Lal 2005: 190) may pushback further the date of the beginning of Copper technology at Mehrgarh, Bagor and Ganeshwar to the beginning of the seventh millennium BC or still earlier.

It may be recalled here that the dates from Bhirrana are in conformity with the dates reported much earlier from the Chalcolithic levels at Koldihwa *viz.* PRL-100 : 5440 BC and PRL-101 : 4530 BC (Pal 1986 : 46) on calibration these two dates become 6375-5645 BC and 5410-5010 BC respectively (Possehl 1988:184). These dates were however, considered then as too early for a Chalcolithic deposit and were therefore believed to represent the Neolithic level at the site (Sharma *et al.* 1980). Such an early date for the introduction of copper in the Ganga Valley would have significant bearing in assessing a true Neolithic strata of the region.

In the light of these evidences discussed above, the problem is that even if we characterize the Mesolithic levels exhibiting evidence of domestication of animals and cereal plant cultivation as 'Aceramic Neolithic' or 'Proto Neolithic', we find a true Neolithic phase conspicuously absent in Western India. Therefore, it may now be more logical to accept that early stages of domestication and cereal cultivation, either jointly or separately are the characteristic diagnostic traits of Mesolithic or Advance Mesolithic periods rather than that of the Neolithic in Indian pre-historic situations.

The Ganga Valley

It is in this background that we intend to discuss the Neolithic cultures of the Ganga Valley. In this region the identification of Neolithic levels has generally been done on the basis of criteria such as presence of evidence of (a) cultivation of rice, (b) domestication of animals, (c) cord-impressed pottery, (d) occurrence of ground celts, either collectively or separately.

However, closer examinations of the material contents from the respective deposits of the sites reveal certain inherent problems. They are:

1. Validity of certain criteria generally accepted for the identification of Neolithic settlements as noted above are themselves questionable.

2. Stratigraphical position of a Neolithic deposit occurring in between a Mesolithic and Chalcolithic in a continuous sequence is not yet demonstrable at any site in the region.

3. The material cultural milieu of Neolithic sites of the Vindhyas and the Sarayupar plain differ from one another. Such differences are also exhibited by the sites of the Sarayupar region themselves, though they are all generally designated as Neolithic.

4. The chronological horizon of the Neolithic deposits in the Ganga Valley as such is also far from settled. The pre-copper age character of the Neolithic culture is also therefore, uncertain and questionable.

This brings us to a reassessment of the available data related with the criteria of identification of a Neolithic culture of the region:

(a) Regarding the cultivation of cereal plants in the mid-Ganga Valley, it may be pointed out that poorly preserved kernel of rice is reported from Damdama (Kajale 1990: 90) from layer 6 of the deposit. This evidence is further corroborated by the reported occurrence of domesticated rice along with barley from Damdama (Saraswat 2000: 24-25). A similar evidence in the form of recent finding of cultivation of rice from aceramic Mesolithic deposit at Bajpur in Orissa (Harvey *et al*. 2006: 30), corroborate the fact that rice was cultivated in India during the Mesolithic period. Though certain palaeo-botanists have doubted the authenticity of Mesolithic evidence of Damdama on the basis of certain erratic and misleading carbon dates, their arguments now seem to be purely speculative. Cultivation or foraging of rice may also be supposed to have been continuing in the Advance Mesolithic levels at Chopani Mando, where impressions of charred rice husks were found in the core of the pottery and mud-clods. It is therefore reasonable to presume that cultivation of rice not only continued but was further consolidated during the Advanced Mesolithic and Neolithic periods. Almost all the sites *viz*. Mahagara, Koldihwa, Tokwa, Senuawar, Jhusi and Lahuradewa identified as Neolithic have attested to the cultivation of rice from the earliest deposits at the respective sites, indicating an earlier established practice. However, the exact nature of the earliest deposits at these sites, if it could be accepted as Neolithic, has been discussed later, as according to some recent carbon dates available, the beginning of these settlements go to as early as eighth-seventh millennium BC. This chronological bracket has now been suggested for the beginning of the Mesolithic period (Misra 2007: 8). Considering that the date proposed here for the beginning of the copper in the Ganga Valley as sixth-fifth millennium BC, the duration left for the advanced Mesolithic and Neolithic becomes too short are negligible. The evidence thus seems to contradict the view that the rice known to the Advanced Mesolithic people was only of wild variety (Saraswat 2005: 160).

Therefore, the origin of cultivation of rice in India and particularly in the Gangetic valley did not take place in the Neolithic period but much earlier, going back to the Mesolithic period.

(b) Along with bones of wild animals, bones of the domesticated animals like sheep, goat and cattle has been identified by Alur (1980) from Mesolithic sites of Sarai Nahar Rai, Damdama and Mahagara. Again bones of a single goat and cattle has been found from Damdama (Thomas *et al.* 2002:374) but the evidence is being presumed to be a 'later intrusion'. Doubts raised on the authenticity of the evidences at the above mentioned Mesolithic sites, based on doubtful and erratic carbon dates assigning second and first millennium BC to this level, lead certain scholars to presume that 'India appears to be the back-water, as far as the beginning of agriculture go, despite the early beginning of both in west and east Asia (Agrawal 1982: 92). Similar view needs drastic revision now. Such presumptions about 'later intrusion' without identifying the later intrusion stratigraphically in the respective deposits of the sites do not appear to be justified. Nor such a rare data could be considered as negative evidence on the issue. Moreover, there is not a single material object reported so far at Damdama and other sites which may establish an intrusion or contact with any later culture. It has also been asserted by the excavators that there is no disturbance in stratigraphy at the site. In such a situation, some doubtful carbon dates, assigning 2nd or 1st millennium BC to these deposits, may not be used to prove either disturbance or later intrusion. Rather, such dates should be rejected as being erratic. As mentioned earlier, bones of domesticated animals have been reported from several Mesolithic sites of western India. Therefore, the findings occurring at Damdama, probably through exchange in the mid Ganga Valley, may not be ruled out. The existence of similar evidence in the form of crouched burials in the Ganga Valley as well as western India (Langhnaj and Loteshwar) indicates demographic mobility between the two regions (Sahi 2005). Moreover, the use of similar pyrotechnology in production of microliths indicates contact between the two regions. While describing the Mesolithic tools from the factory site of Lewan in Bannu basin of Pakistan it has been noted that they include microliths closely similar to these of Rajasthan, the Vindhyas and the Central Ganges Plain, made largely from chert which appears to have been heat treated (Allchin and Allchin 1997: 108). Bones of sheep, goat and cattle have also been reported from the Advance Mesolithic site of Chopani Mando (Misra 1977). Therefore, the domestication of animals also may not be considered as an essential diagnostic trait of the Neolithic culture of the Ganga Valley as it exists in earlier levels of Mesolithic and Advance Mesolithic settlements.

(c) The cord impressed pottery which is also considered to be the diagnostic trait of the Neolithic culture of the Ganga Valley (Sharma 1980) also does not appear to have been introduced in the Neolithic period. It may be mentioned here that technological innovation like manufacture of handmade pottery represented by (i) Ochrous Red and (ii) khaki (brownish grey ware) with incised decoration on its external surface was self acquired trait of the Advance Mesolithic people of this region (Pal 1986). Cord impressed pottery – a variety of the two wares mentioned above, has been reported from Advanced Mesolithic levels at Chopani Mando, Baghai Khor, Lekhahia and Ghagharia (Pal 1986: 84, 121). This kind of pottery is not only found continuing in the Neolithic, Chalcolithic and Early Historical ceramic complexes of the Ganga Valley but it is also reported in the OCP ceramic tradition at sites like Sarangpur (Suraj Bhan 1967) and Madarpur (Sharma 2001-2002). Therefore, the pottery which neither originated nor was confined chronologically and stratigraphically to the Neolithic levels, may not be accepted as a diagnostic trait of the Neolithic culture of this region. However, it may be noted that Black Burnished Ware, which is not found in the Advanced Mesolithic levels at any site, is invariably associated and is a new introduction along with Neolithic celts.

(d) It is common knowledge that ground stone celts are the characteristic stone tool of the Neolithic culture and its role in identification of a Neolithic deposit may not be overlooked. On the Ganga plain sites, it is mostly the triangular celts which are reported in sporadic numbers. In the Sarayupar region, the earliest occurrences of such celts are reported from Lahuradewa II and Narhan I (Tewari *et al*. 2003, 2006; Singh 1994a, 1994b) which are well defined Chalcolithic deposits. At the most, these deposits may be taken as Neolithic-Chalcolithic. Along with these celts a Grey Ware is also introduced often bearing creamish or ochrous red post-firing painted designs. This variety of ware along with triangular celts is reported from corresponding deposits at Chirand, Taradih, Maner and Chechar-Kutubpur in the middle Ganga plains. This ware is also reported from the Neolithic deposits in southern India at Piklihal, Utnur Brahmagiri, Sangankallu, Tekkalkota etc.

However, the two traits i.e. Burnished Black ware and celts of the Neolithic culture are conspicuously absent in the preceding deposits of Sarayupar region at sites such as Lahuradewa IA and IB, Imlidih I (pre-Narhan I level but also Chalcolithic) and Sohagaura I. A very close similarity in ceramic complexes of these levels of Ganga plain sites with those from advanced Mesolithic settlements of the Vindhyan region may indicate the extension of the latter culture into former region, of course with or without microliths.

In the Vindhyan region rounded celts with squarish or oval cross-section are reported from Mahagara, Koldihwa, Panchoh, Indari and Tokwa (Pal 1986; Misra 2007: 9) all identified as Neolithic sites. In the same deposits Black Burnished Ware is also reported. However, the exact stratigraphic level of the introduction of these items of material culture in respective deposits is not clearly specified in the reports and therefore is vague. In the light of the above evidence, one can define a true Neolithic cultural level which is characterized by the introduction of Grey or Black Burnished Wares and grounded stone celts, in a continued preceding Advanced Mesolithic cultural milieu, particularly in the Ganga Valley.

Therefore, in the light of evidences highlighted above and discussions noted, a logical inference can be drawn that neither corded ware, nor domestication of animals and plants seem to be valid criteria for identifying a true Neolithic Cultural level. If so, the question arises – has the Neolithic culture and its nature been correctly identified as it has been done so far in the Ganga valley? In the following pages fresh attempt has been made to understand the cultural milieu, antecedents and the nature of the Neolithic level of the Ganga Valley.

This leads us to discuss another aspect of the Neolithic culture. The problem raised here is– Does the Neolithic culture of the Ganga Valley represent an essential transitional stage between the Mesolithic and the Chalcolithic as a part of the main cultural stream?

If the presently identified Neolithic cultural levels at different sites are correct, there is not a single site in the Ganga Valley or for that matter in entire Indian context where on the same site Neolithic deposit overlies a Mesolithic deposit with a cultural and stratigraphical continuity. Even sites like Kuchai (*IAR* 1961-62:36), Nagarjunakonda (Subrahmanyam 1975) and Sangankallu (Sankalia 1969) etc. do not show any continuity between Mesolithic and Neolithic levels. The evidence from these sites simply indicates 'cultural succession' without any continuity.

It is also surprising that none of the sites particularly of the Vindhyan region provide definite evidence demonstrating a cultural and stratigraphical continuity between the Neolithic and Chalcolithic levels as well. A wide chronological gap has been indicated at Koldihwa (Pal 1986: 131-32) in the Belan Valley, Tokwa (Misra *et al.* n.d; *IAR* 1999-2000 : 189) on the confluence of the Belan and the Adwa and Jhusi (Pal 2006) on the confluence of the Ganga and the Yamuna. A similar evidence indicating a break at Lahuradewa has already been discussed earlier. Therefore, a cultural phase (Neolithic) which does not show any cultural continuity with either its preceding or succeeding phases, can only be considered as intrusive, in spite of the fact that some Advanced Mesolithic ceramic traditions and microlithic industry are found continuing in Neolithic levels. Therefore, the Neolithic of the Vindhyas may not be accepted to represent a transitional stage in the evolutionary process of the main cultural stream of the Ganga Valley.

Neolithic: Cultural Milieu

It is now desirable to discuss the nature and character of the so called Neolithic culture. All the sites identified as Neolithic of the Ganga Valley do not exhibit an uniform and identical material milieu. A distinction between the cultures of the Ganga plain and those of the Vindhyan region has been noticed to group them as separate complexes (Pal 1997: 40) admittedly with certain common features inherited from the earlier Advanced Mesolithic phase.

The Vindhyan sites have yielded rounded stone Celts, whereas the Ganga plain sites have yielded mostly triangular Celts and that too in Chalcolithic context. This is demonstrable at Lahuradewa, Narhan, Chirand, Senuwar etc., where they are associated with red and grey wares along with black-and-red ware. The red ware including the corded ware is common to both the regions. The ceramic complex of the Vindhyan sites is characterized by the presence of black burnished ware and total absence of black-and-red ware. On the sites in the plain bone tools are found in greater variety and frequency and microliths are either absent or in negligible frequency. Whereas on the Vindhyan sites microliths are in greater frequency but bone tools are in small numbers. These distinctions in the cultures of the plain and the Vindhyan region are in fact due to the reason that both are not coeval.

Certain pottery types like spouted vases with pointed bottom, lipped bowls, footed and perforated bowls/basins, bowls on stand, knobbed vessels etc. besides, post firing scratch decorations and post-firing ochre paintings represented by linear, criss-cross, concentric circles, semi-circles and oblique designs reported from Imlidih, Lahuradewa, Chirand, Senuwar etc. are not found on the Vindhyan sites. Steatite beads are found on the plain sites, indicating a direct contact with coastal Gujarat, but these are almost absent on Vindhyan sites. Most of these ceramic features in shapes and decorations mentioned above in context of plain sites are Chalcolithic in character, as they are found on Chalcolithic sites of upper Ganga Valley (OCP) culture and those of western India. It has been admitted by Prof. P. Singh the excavator of Imlidih that the character of Period I at this site is Chalcolithic (personal communication), as appliqué and post-firing incised designs found on some of the sherds from Imlidih compares favourably with Chalcolithic pottery from Koldihwa (Singh 1993: 34). Therefore, except the earliest deposits at Sohagaura and Lahuradewa IA represented by layer 14 only, the rest are in fact Chalcolithic in nature. Even layer 14 of the latter site does not come within the definition of Neolithic culture of the region. This point has been elaborated later. Thus, the identified Neolithic settlements of the Ganga plain are in fact Chalcolithic in character.

There are many shapes and decorative features of the OCP which are commonly found on these Neolithic sites of the Ganga plain like Imlidih with the difference that on the former sites they are found in the painted form where as on the latter they are in the form of incised designs comprising spiral and opposed triangles. The common shapes comprising pedestalled bowls, spouts and others like dish-on-stand (Sahi 2005b: 97). These more evolved features of the Neolithic-Chalcolithic culture of the Ganga plain are later than those of the Vindhyan region where they are absent. Greater antiquity has also been assigned to the rounded celts of the Vindhyan sites over the plain sites represented by celts mostly having triangular cross-section. At Chirand, however, both types were found. In the light of above mentioned features, the Vindhyan Neolithic may be classified to represent Phase-I and those of the Ganga plain as Phase-II of the Neolithic culture of Ganga Valley as a whole.

Most of these Neolithic characteristic features of both phases continue in the Chalcolithic culture of the Ganga plain including the ceramic complex comprising red, black-and-red, black slipped and grey wares. So far as Vindhyan region is concerned the evidence from Tokwa (*IAR* 1999-2000: 189) corroborates the evidence from Koldihwa reported earlier (Pal 1986: 131), which indicates that there was a gap between the disappearance of the Neolithic people and the arrival of the Chalcolithic people. These two cultures also exhibit two different types of ceramic tradition. While Neolithic pottery is hand made, the Chalcolithic pottery is wheel made. There is also difference of treatment of clay and manufacturing of pots. The characteristic ceramic tradition of the Vindhyan Neolithic is not represented in the Chalcolithic deposits, which bears closer resemblance with those of the plain sites (Singh 1993: 21-35; 1994: 41-48). All the ceramic features of the plain sites are found introduced in the Chalcolithic culture of the Vindhyan region for the first time. But as they are found absent in the earlier Neolithic levels of this region it appears that the Chalcolithic culture of the Vindhyas is an extension of the Chalcolithic culture of plains rather than evolved from the Vindhyan Neolithic.

Thus there appears to be a unique dichotomous situation. On the one hand, there appears to be no stratigraphical continuity from the preceding Advance Mesolithic culture to the succeeding cultures as found at Chopani Mando, Morahana Pahar etc., but on the other, there is definitely a continuity visible in the material contents. As discussed earlier, almost all the characteristic traits of the Neolithic and Chalcolithic cultures have their origin in the earlier Advanced Mesolithic culture. Therefore, to comprehend the true nature of the Neolithic culture of the Ganga Valley a review of the cultural evolution in the Ganga valley is desideratum.

Cultural Evolution

To recapitulate, it may be mentioned that it was the Epi-Palaeolithic culture of the Vindhyas which gradually evolved through non-geometric to geometric Mesolithic and finally to Advanced Mesolithic or Proto-Neolithic cultural stage as indicated at Chopani Mando (Misra 1977; 2007). The last phase is characterized by geometrical microliths often associated with diminutive ones and the introduction of pottery.

During the Aceramic Mesolithic levels itself (Sarai Nahar Rai, Mahadaha and Damdama), we have few but definite evidence of sedentary settlements. The people were the earliest hunters of animals and cultivators and foragers of wild plants including rice available in plenty in the region. Besides microliths they produced bone tools and ornaments, heavy stone implements and objects like quern, mullers, grinders, hammers, anvils and ring stones. They had established trade contacts with Mesolithic people of the western, central and eastern India. The Mesolithic stone industry of Lewan in Pakistan closely resemble with those from Rajasthan, the Vindhyas and the Central Ganges plain made largely from chert, which appears to have been heat treated (Allchin and Allchin 1983). Similarity in the types of heavy duty stone implements including querns, hammer stones, anvils and ring stones have also been noticed in the Indo-Gangetic Valley during this period. Their artistic expressions are attested by several rock-paintings. However, the most significant evidence from the Mid-Ganga plain sites is about domestication of rice and barley and animals like sheep, goat and cattle as already mentioned, though these are generally considered to be diagnostic traits of the Neolithic. In short they were no primitive, barbaric people living in isolation. The present author has indicated elsewhere (Sahi 2005b: 92) that there are sufficient evidences to show that there was a movement of Mesolithic people from the Mid-Ganga valley to the western regions including Gujarat, Rajasthan and west of the Indus in Pakistan.

The introduction of pottery including the cord impressed variety was the self acquired trait of the Mesolithic people of the Vindhyan region, which transformed them from aceramic Mesolithic stage to Proto-Neolithic/Advanced Mesolithic stage (Sharma 1980; Thapar 1984; Pal 1986; Misra 2007: 11). Probably, this stage was reached by about 8th-7th millennium BC.

Subsequently, there appears to have occurred a stratigraphical break indicated by the desertion of these settlements. Whether this desertion was caused due to palaeo environmental conditions or any other factor, is yet to be investigated. But it needs serious attention. Shortly after this break the entire mid-Ganga valley is seem to have been colonized by the so called Neolithic people. But here we propose to offer an alternative interpretation to the related evidence which reflects the Neolithic culture in a new perspective.

The Emergent Picture

In this context I intend to highlight some significant evidences which have been ignored, so far. Let us examine the evidence from Mahagara (Sharma *et al*. 1980b, Pal 1986: 40,120). The site is situated on the confluence of the course of old and new Belan opposite Koldihwa in Allahabad district. The site was excavated horizontally by D. Mandal and J.N. Pal. It is presumed to be a single culture site. The index trench excavated down to the natural soil revealed 2.60 m thick deposit divided into 17 layers (21 floor levels). In other squares digging was confined to the upper most phase of the Neolithic deposit.

On the basis of over all evidences including the ceramic complex, the excavators concluded that the 'Vindhyan Neolithic is nearer to the Mesolithic culture of the same region and it evidences a primary stage of Neolithic period.' From the lowest floor level no burnished black ware was found and in next four floor levels above it the frequency of this pottery varies between 0.2% to 1.2%. Whereas it suddenly rises to over 5% in layer 16. The possibility that the black pottery of the lower levels at this site belonged to ill fired *Khaki* ware variety of the Advanced Mesolithic ceramic complex may not be ruled out. More so because at Jhusi also black burnished ware is conspicuously absent in the lower levels (Personal observation through the courtesy of Prof. J.N. Pal). This black burnished ware is like the burnished red ware. The demarcating feature being mainly in surface colour and fabric. A thick slip varying in colour from jet black to dark grey is applied on the pot. The black or grey colour is not a result of reduced firing technique but caused by probably black pigment in the slip solution (Pal 1986: 113).

Thus, on the one hand, there is absence of burnished black ware. On the other hand, it is observed that on the basis of incised decoration also the ceramic industry of Mahagara and Koldihwa seem to have some relation with that of the advance Mesolithic of Chopani Mando and Baghai Khor (Pal 1986: 77).

Regarding the stratigraphical position of the occurrence of the rounded celts at different sites specific information is either vague or not available. However, it appears that these celts are also not found in the lowest levels at sites designated as Neolithic. I am given to understand that at Jhusi the Celts are not found in the lowest levels. At Kunjhun, situated on the right bank of the Son in Sidhi district of Madhya Pradesh, the site has been eroded considerably and only the basal layers of the Neolithic cultural deposit measuring about 80 cm have survived. An exploratory investigation by a team of archaeologists from the University of Allahabad yielded Neolithic pottery resembling to that of Mahagara and Koldihwa, along with a ring-stone, clay dabber, terracotta bangle piece, burnt clay lumps with reed impressions, animal bones, microliths comprising cylindrical fluted cores, chips, retouched blades, backed blades, lunettes and scrappers fashioned on chert, chalcedony and agate. But the Neolithic rounded celt was still missing from this deposit. It was collected however from the adjoining area (*IAR* 1975-76: 27; Pal 1986: 44). Again in 1982 an excavation was conducted by the joint team of archaeologists from the University of California, Berkeley (USA) and University of Allahabad, to the west of habitation site (*IAR* 1981-82: 43-44) where lay the secondary deposit containing the material from the habitation site. Here also material almost similar to those described above was found but rounded celts were still not found. These details are to be given to demonstrate that in the basal levels of this site and others identified as Neolithic probably the rounded celts are absent. Meaning thereby that Neolithic traits get introduced later at these sites. However, the character of the basal deposits appears to be that of the advanced Mesolithic culture.

Now it may be desirable to work out the introduction of copper in the Vindhyan region, in juxtaposition to those of the Neolithic. Three dates from Bhirrana (Haryana) from the earliest deposits (Period IA) characterized by the Hakra Ware ceramic complex has been mentioned earlier. These dates range between 6647 BC and 4353 BC (Rao *et al*. 2005: 67; Lal 2005: 190).

It may be recalled here that the dates reported much earlier from the Chalcolithic levels at Koldihwa viz. PRL-100 : 5440 BC and PRL-101 : 4563 BC (Pal 1986: 46), which on calibration become 6375-5645 BC and 5410-5010 BC respectively (Possehl 1988: 184). Interestingly, the dates from Koldihwa is in complete conformity with the dates obtained for Hakra Ware culture at Bhirrana (Period IA). It is also significant to add further that an evenly comparable to Black Burnished ware of Neolithic denomination a ware called 'Black Burnished Ware' of which a few shreds have also been found in the deposits of period IA at Bhirrana (Rao *et al*. 2005: 62). A similar ware called 'Black Slipped Red Ware' has also been reported in the Hakra Ware – OCP ceramic complex at several sites.

These evidences are sufficient enough to illustrate that there was a closer contact between the Neolithic/Chalcolithic people of the Ganga valley and the Chalcolithic Hakra Ware – OCP – Copper Hoard people as chronologically they appear to be coeval. It may be presumed that perhaps wheat and barley at Jhusi layer 55 at the earliest and copper at Koldihwa were derived from the Hakra – OCP people of the Saraswati valley.

Though it has been claimed that Jhusi presents the proof of cultural continuity in an unbroken sequence right from the Mesolithic through the Neolithic to Chalcolithic, the Advance Mesolithic level at Jhusi still remains to be properly delineated and highlighted. It may be expected that further excavation at this site may throw some light on this phase of the Culture.

In such a situation, the present author is in complete agreement with the view expressed by Prof. D. Mandal (n.d.) who proposed, on the basis of evidence from Mahagara, that 'Mesolithic is the primary stage of the Neolithic period.' It is further corroborated by the fact that on the basis of decorated patterns the ceramic industry of Mahagara and Koldihwa have some relation with the ceramic industry of Chopani Mando on the one hand and Baghai Khor on the other (Pal 1986: 77). Therefore, on a closer perusal of the available evidences from other sites as well it may be stated that there are definite indicators to suggest that the settlements identified as Neolithic were, in fact, in their initial stage colonized by the Advanced Mesolithic people themselves. It in continuous sequence of the Advanced Mesolithic and Chalcolithic that Neolithic traits appear to have been introduced either simultaneously or a little later than the introduction of copper in the Ganga valley. The chronological brackets of early Chalcolithic deposits at Bhirrana and Koldihwa make them coeval and more or less to the same chronological bracket is placed the Neolithic culture at Jhusi, if we do not take into consideration the earliest dates at Jhusi and Tokwa as they are derived from the later deposits at these sites. To recapitulate:-

Bhirrana Period IA	6647 BC	4353 BC
Koldihwa Chalcolithic	6375 BC (Cal)	5410 BC (Cal)
Jhusi Neolithic	6196 BC	5837 BC
Tokwa Neolithic	5976 BC	4797 BC

However, the early dates coming from the later deposits at the respective sites are:

Jhusi - BS-2526 : 7477 BC

Tokwa - BS-2417 : 6591 BC

This situation can be explained by interpreting that the samples of these dates originally belonged to the lowest levels of the sites but were found during excavation in their secondary deposit. Such possibility through human activities of the then people of the later levels may not be ruled out. Hence, these dates may be accepted to represent the Advance Mesolithic levels at the respective sites.

In the Sarayupar region, in order to understand the true nature of the Neolithic culture, we propose to take up for examination Lahuradewa (district Sant Kabir Nagar) (Tewari *et al*. 2003, 2006a, 2006b) because it has provided chronological and cultural sequence from seventh millennium BC to Early Historical period.

Here the excavators have grouped layers 13 and 14 of trench YA1 quadrant No.1 to represent the earliest cultural period (Period IA) and designated it as 'early Farming Phase'/Neolithic (Tewari *et al*. 2006b: 41 fig. 3). The excavators claim that a variety of painted black-and-red pottery, which in earlier excavation was found in the levels of Period IB (being the Chalcolithic Period) has been found in still earlier deposit layer 13 and also 'their stratigraphic context is carefully ascertained' (Tewari *et al*. 2006a: 70). The evidence that this painted pottery belongs to Chalcolithic level is further corroborated by finding of identical pottery from Chalcolithic Imlidih Period I which has many such examples. If so, layer 13 must be taken to represent Period IB rather than IA, otherwise layer 14 would also be considered to represent the Chalcolithic phase at the site, and in that situation to claim that there is a Neolithic strata at the site would be ridiculous. But actually as observed by the excavators a silt deposit intervenes between layer 13 and 14 and it seals layer 14 along with the channel which the occupants of layer 14 had constructed making it defunct.

This kind of strata classification for periodisation of cultures results in the mix-up of the ceramics complex of two different cultural levels. Layer 14 needs to be revised to represent only Period IA at the site. Presently all the illustrated pottery representing Period IA comes from Layer 13 (Tewari *et al*. 2003: 42, Fig. 2).

In the Second Preliminary Report (Tewari *et al*. 2006) Fig. 4 illustrates the pottery of Period IA, but the exact shapes coming from the lowest (layer 14) deposit has not been specified. In absence of his data, the determination of its exact cultural denomination may not be fruitful. Regarding this proto-Neolithic/pre-Chalcolithic level represented by layer 14 and datable between 6th and 4th millennium BC, simply with the evidence of domesticated rice, but without any evidence of domesticated animals, ground stone celts and grey/black wares do not qualify this deposit to be designated as Neolithic.

For identification of the Neolithic, the evidence is very clear at Lahuradewa. Here the black/grey wares appears in later levels of earlier Chalcolithic Period IB represented by layers 11, 12 and 13 whereas the stone celts are reported from Period II which represents a later phase of the Chalcolithic culture at the site. The material context of Lahuradewa II represented by layers 10, 9, 8 and 7 corresponds with Narhan I, wherefrom Neolithic celts are also reported (Singh 1994a). Besides, Neolithic celts have also been reported from the Chalcolithic levels at Manjhi, Chechar, Sonpur and Barudih. Therefore, these sites of the Sarayupar region present a picture similar to that of the western India (Rajasthan and Gujarat) where Advanced Mesolithic/Proto-Neolithic cultures are transformed to Chalcolithic stage without any Neolithic interlude. Whatever, Neolithic traits are found on these sites they occur in Chalcolithic levels indicating a contact with southern Indian Neolithic-Chalcolithic people.

Regarding the Vindhyan region, the view expressed above that the earliest deposits at the sites identified as Neolithic, were actually the settlements of the Advanced Mesolithic people is indicated further by the fact that there is evidence of only rice and small millet cultivation in this level. This fact is demonstrable at Mahagara and Koldihwa (Misra 2007: 10). A similar evidence is reported at Tokwa in the Vindhyan region and Senuwar in the Son valley (Harvey *et al*. 2005; Pal 2006: 12). The earliest evidence of only rice cultivation at Lahuradewa comes from layer 14 dated to 6442 BC (Tewari *et al*. 2006b).

Jhusi, on the confluence of the Ganga and the Yamuna, presents an interesting history of the evolution of agricultural crops, though no archaeo-botanical material has been identified from the lowest deposit (layer 56). But in the light of evidence from Koldihwa, Mahagara, Tokwa and Senuwar it may be presumed that the earliest crop to have been cultivated here (Jhusi) would have been rice. In the second stage (Layer 55), besides rice the new crops introduced are wheat and barley, indicating a contact with the early Chalcolithic culture (Hakra-Ganeshwar-OCP) of western India. In the third stage (Layer 53), the crops now known are: rice, barley, dwarf wheat and bread wheat, lentil, pea, grass pea, horse gram, grapes and *ber* by about at least 6193 BC being the assigned date of this level at Jhusi.

The picture that seems to be emerging now is that while the Advanced Mesolithic people were flourishing on these sites, it is in the upper levels of these sites that we find the introduction of rounded celts and black burnished ware in the Vindhyan region as intruding elements. Such a composite cultural level characterized by the coexistence of indigenous Advanced Mesolithic and external Neolithic may in fact be called as the phase of 'Neolithic Intrusion' in the Ganga Valley.

Neolithic Intrusion

Intrusive nature of the Neolithic culture of the Ganga Valley is reflected by the fact that:

(a) None of the sites usually identified as Neolithic, are Neolithic tool manufacturing settlements from the very beginning. Ready made ground stone celts are found in sporadic and small frequency. They appear to be objects indicating only contact and not an important trait of the culture. (b) The ground stone Celts, recovered in excavation at Koldihwa, Mahagara, Panchoh, Indari, Tokwa and Kunjhun are of rounded celt tradition exclusively (Misra 2007: 9). But this tool tradition is supposed to be the tool type of the Neolithic culture of north-east India and further a field of south-east Asia. (c) The triangular celts which conform to the characteristic tool type of the southern Indian Neolithic culture are conspicuously absent on these Vindhyan sites. But a Neolithic celt tradition, which may be considered as the characteristic type of the Ganga Valley is not known so far. (d) Moreover, horse gram, which is also supposed to be of south-east Asian origin, occurs for the first time at Jhusi almost in the upper-level of the deposit (layer 52) corroborating late arrival of influences from south-east Asia. (e) At the Vindhyan sites, the microliths and ceramic complex typical of the Advance Mesolithic culture occur from the earliest levels and continue in the later deposits, as indicated at Mahagara.

Intrusive nature of the Neolithic culture is also indicated by the nature of production of black burnished ware and grey/black wares, which are its diagnostic traits. These pottery types have a uniform black core indicating uniform firing conditions. Black burnished ware is a black slipped on red pottery and is fired in open kilns. The significance of grey pottery lies in the fact that they are fired in kilns which can produce reducing conditions, a technology which was known to these Neolithic people. Since this technique of producing pottery was unknown to the Advanced Mesolithic people who used to fire their pottery in open bonfire like conditions (Pal 1986:85), this event marks the introduction of a new firing technology of pottery and potters in India as a specialized professional class.

Gufkral meaning a settlement of potters was perhaps one habitational site of such professionals. It may be of some significance to be noted here in this context that the term for potter in India is *Kulal* and it could have been derived from Kral. It is also certain that *Kulal* does not occur in *Rigvedic* lexicon and therefore, the term seems to have been a borrowed one in later *Vedic* vocabulary. This adds further strength to the intrusion theory on philological ground. The actual intrusion of certain new ethnic element is corroborated by skeletal findings from excavations at Burzahom (Basu and Pal 1980; A.K. Sharma 1985: 52). The details will be given later.

Burnished grey ware, the characteristic pottery of the Stage II Neolithic culture of the Ganga plain, was also produced under reducing conditions. This pottery was often decorated with post-firing ochrous painting. In the Ganga plain it is reported from Chirand, Taradih, Chechar, Kutubpur and Senuwar often associated with triangular celts. Outside the Ganga plain this kind of pottery is also found in association with triangular celts at sites like Langhnaj (upper level) in Gujarat and southern Indian sites such as Piklihal, Utnur, Brahmagiri, Sanganakallu, Tekkalkota etc. (B.P. Singh 1997: 9). These findings clearly show the direction from which the intrusion of Neolithic traits in the Ganga Valley took place as this pottery associated with triangular stone celt is the hall mark of the Southern Neolithic culture, also called as the Dravidian (Allchin 1959 : 140) or non-*Vedic* (Korisettar *et al*. 2002 : 141).

Thus, in the light of the evidences mentioned above it may be inferred that Grey /black burnished wares and triangular and rounded stone celts are all intrusive traits in the Ganga valley, in a continuous Advanced Mesolithic – Chalcolithic sequence. It may further be noted that different people or the ethnic groups represented by these traits on arrival into the mid Ganga Valley seem to co-exist with the surviving Advance Mesolithic people in the same cultural level indicating a 'cultural convergence'.

It is also significant to mention that these intrusions almost synchronize with the introduction of copper in the region. This inference is based on the chronology of introduction of copper in the region and of the intrusions discussed earlier. This fact also gets corroborated by the occurrence of ground stone celts and copper simultaneously at Langhnaj (upper levels), Kallur and Mehrgarh IB outside the Ganga valley datable between 5000 BC and 4500 BC (Sahi 2005b). If so, it may lead one to infer further that temptation for such intrusions may have been either to acquire copper objects or its technology or to become copartners in its trade.

For another direction of flow of intrusive elements, it is believed to have come through Sikkim (Thapar 1984: 41) as characteristically black and grey wares are found in the ceramic complex of Yang Shao Neolithic culture of China. The earliest date of Pan Po phase of this culture is 4115 ± 110 BC (Chang 1977: 487). Thus there seems to be no chronological disparity. From the hilly tracts in the Himalayan foot hills, Neolithic stone implements have not only been reported from Assam but from Sikkim and Nepal. The former comprise harvester, knife, axes, adzes and single and double perforated celts, mostly made in schist, shale and basalt. Some of these types like the double perforated celts are typical of this region and have affinities with the South Asian Neolithic assemblage. The adzes, honan knife, perforated celts and harvesters are typical of the south Chinese Neolithic assemblage (Sharma 1985: 52; Singh 2002: 139). Such intrusions are demonstrable in the Kashmir valley.

Alternatively, the flow of intrusive elements of Neolithic Stage I, from Kashmir Valley or vice-versa, may not be ruled out, because besides the grey and black burnished wares and mat impressed pottery – a characteristic feature of the Kashmir Neolithic, has also been reported from Lahuradewa Period II (Tewari 2003: 47 Plate 24) and Chirand (Verma 1971: 21). Burnished black ware is a common factor between Burzahom II and Vindhyan Neolithic. It has been argued by Thapar (1984: 41) that Kashmir Neolithic culture has distinctness of its own. But, it has no doubt borrowed certain elements like grey and burnished black wares, jade beads and harvesters having holes, etc. from the Neolithic culture of China.

In this interaction along with ideas and traits there also appears to have been an influx of people having their own faith and language intruding into Indo-Gangetic plains. On this point significant evidence in the form of skeletal remains comes from Burzahom. According to the report on human skeletons (Basu and Pal 1980; Sharma 1985: 52) the bulk of the population from Burzahom were long headed (dolichocranic) with such features as the sloping long and narrow head. The people were of sturdy built with tall to medium stature, comparable to those from the Mesolithic sites of the Pratapgarh district in the mid-Ganga plains. In this collection at Burzahom a very significant evidence is provided by the presence of a male skeleton having greater cranial width (brachycranic) markedly wider bizyyomatic and nasal breadth, wide palatal width, low upper facial and nasal height. These details of the facial features, which are quite different from those of the basic population of Burzahom, reminds us of the references to Dasas in the *Rigveda* – the tribes who were regarded as aliens and barbaric, having snubbed noses and speaking strange language (Romila Thapar 1987: 74). Kikatas mentioned in the Rigveda (III.53.14) was one such tribe settled in the Ganga plain. Another such tribe, the Kiratas, believed to be of Indo-Mongoloid origin (Chatterjee 1988: 318), was settled in Nepal and Assam. These people could be identified as the people intruding into the mid-Ganga valley through Sikkim (Thapar 1984) and probably in the Kashmir valley.

Therefore, on the combined testimony of the literary as well as archaeological evidence, it may be proposed that there were intrusions of certain ethnic groups, having different physical and facial features and speaking unfamiliar language, from north, east and south into the Indo-Gangetic valley occupied by the Hakra-Ganeshwar-OCP-Copper-Hoard people who had monopolized copper industry. These intrusions start occurring almost synchronizing with the introduction of copper.

This is also demonstrable very well at sites like Langhnaj (Sankalia 1965, Sonawane 2002:110) and Mehrgarh (Jarrige 1982:82). At both these sites, Neolithic celts and copper appear simultaneously, datable to 5th-4th millennium BC. At the former site grey/black burnished ware is also attested in the same deposit. A similar situation may also be visualised in the Ganga valley provided carbon dates of Koldihwa (KDWI) are accepted as valid and authentic dates as such for the Chalcolithic deposit, from which the samples for dating were actually derived. To recall it, these dates are PRL-100 : 5440±240 BC and PRL-101: 4530±185 BC. Hence, chronologically and culturally, this Chalcolithic phase of Koldihwa becomes co-eval with that of Hakra-OCP cultural complex. At Kallur (Krishnaswami 1953: 71) copper swords were found on the surface. In the excavation made in the wake of this discovery were found a broken flat axe of copper and a few fragments of copper pins. These were further associated with polished stone axes and microliths. Thus, in nature the Neolithic phenomenon of the Ganga valley appears to be more of a socio-economic problem of Indian history.

Chronology

Another problem related with the Neolithic culture of the Ganga Valley is to determine precisely its chronological horizon. In fact chronological assessment of successive cultural periods of not only the Ganga Valley but also of other parts of India is presently passing through a very fluid situation. Based on the then available dates it was fixed between 6000-3000 BP. Subsequently it was fixed between 3rd – 2nd millennium BC (Pal 1986:47). Strictly based on carbon dates from different levels of several sites a chronological reconstruction generally accepted by scholars has been illustrated in Fig. 1. A firm belief in such a reconstruction had led certain scholars like

Agrawal and others (Agrawal *et al*. 1978) to presume that 'there is no linear evolution of food producing technology and the life ways identified as Neolithic by many prehistorians : early farming villages of eastern India were contemporary in time with advanced agricultural centres within the Bronze Age Harappan realm, and Mesolithic communities survived in marginal areas at the same time.'

However, recently obtained dates from Tokwa and Jhusi impel us to undertake fresh exercise in chronological re-estimation. These dates are:

	S.No.	*Sample No.*	*Trench and Layer No.*	*Date cal. BC*
From Jhusi, District Allahabad				
	1.	BS – 2526	SF-7(47)	7477 BC
	2.	BS – 2524	SF-7(50)	5837 BC
	3.	BS – 2525	SF-7(51)	6196 BC
From Tokwa, District Mirzapur				
	4.	BS – 2417	H-9 Pit SB (4)	6591 BC
	5.	BS – 2464	I-8 (6)	4797 BC
	6.	BS – 2369	H-8 (14)	5976 BC

Besides the above dates three dates available from Lahuradewa IA are: BS – 1951: 4220 BC; BS 1967: 5298 BC; ERL 6442 (AMS): 6442 BC.

With the availability of these dates the antiquity of the identified Neolithic culture has been pushed back to 8th millennium BC (Misra 2007: 12). But a closer perusal of the earliest dates from Jhusi and Tokwa and their stratigraphical context, reveal that the youngest deposits at both the sites have given the oldest dates in comparison with the other two dates which come from the lower deposits. Therefore, a caution is required in interpreting the earliest dates as those of the Neolithic levels. These dates may indicate the earliest dates of colonization of these settlements by the Advanced Mesolithic people.

This discrepancy in dates may be explained by presuming that the earliest dates going back to 8th – 7th millennium BC may have come from the samples, which originally may have belonged to an earlier Advanced Mesolithic levels but have somehow come to be deposited in the later levels through the then human activity like making mud walls or paving floors by procuring mud from the earlier levels. This is a feature which can be noticed on archaeological sites during excavations. However, if the view is accepted, it leads one to infer the fact that there may be an earlier Advanced Mesolithic/Proto-Neolithic deposits at these sites and identified as Neolithic, may not be ruled out. The evidences from Lahuradewa including the carbon dates as discussed earlier is an indication in this direction. This point has been elaborated earlier. The earliest introduction of copper in the Indo-Gangetic valley and the dates from Bhirrana has also been discussed already.

Therefore, the following chronology of the Holocene period is tentatively suggested:

Mesolithic non geometric to geometric	10000-7500 B.C
Advanced Mesolithic/Proto Neolithic	7500-6500 B.C
Neolithic (two stages) of intrusion)	5500-2000 B.C
Chalcolithic (three stages)	6500-2000 B.C
Early Iron Age (pre NBPW)	2000 BC-1500 BC

This chronological scheme takes into account, the transition from Advanced Mesolithic to Chalcolithic in Rajasthan, Gujarat and Sarayupar region and also of Neolithic - Chalcolithic overlap in the Ganga Valley, between 5000 – 2000 BC.

The Sequel

As already discussed a gap is attested in the Ganga valley between the Neolithic and the Chalcolithic deposits at sites like Tokwa, Koldihwa in the Vindhyan region and Jhusi and Lahuradewa in the plains. At the last named site a yellow silt deposit (a flood deposit) is reported between layers 14 and 13 ascribed to Period IA (Tewari *et al.* 2003; 2006: 40-41) which filled up the drain and made it defunct, originally dug by the settlers of layer 14. Later some post-holes were found on the top of this silty sealing layer, representing the structural activity of the people of layer 13. The Chalcolithic nature of this later deposit (layer 13) is attested by the occurrence of a variety of decorated pottery identical with those found from Imlidih I.

It has been proposed (Sahi 2005a: 75) to identify the gap between the Neolithic and the Chalcolithic deposits with the break caused by a massive Deluge (Lal 1970-71: 101), which led to the desertion of the OCP sites. Chronologically it can be placed between 3100-3000 BC, which marks the end of the Hakra – OCP and the beginning of the Kot Dijian period. In historical perspective this Deluge has been correlated with the Great Flood of the time of Manu Vaivasvata associated with the Fish episode as mentioned in the *Satapatha Brahmana* (Sahi 2005a; 2005b). The Great Flood of the time of Manu Vaivasvata was also a world wide phenomenon and is assigned 3102 BC as its date (Pusalker 1988: 272-73). If this correlation is accepted, an inference can be drawn that Hakra-OCP – Copper Hoard culture was contemporaneous with the earlier stage of the Neolithic culture. The Koldihwa evidence of copper may be accepted in the same chronological framework.

The OCP-Copper Hoard sites in the Mid-Ganga plain are Sringverpur (*IAR* 1977-78:54-56; *IAR* 1978-79: 57-59; Lal and Dikshit 1979-80), Mirapatti (Kumar 1991) in Allahabad district and

Kamauli (Misra 1997; 57-58) in Varanasi district. This culture survives the Great Flood/Deluge and after a gap, its ceramic traditions re-emerge in the Chalcolithic deposits of the subsequent post-Deluge phase, such as Kakoria and Kausambi (Pal 1986: 125, 148, 167). In western India also the survival and continuation of the Hakra ware is reported from Kot Dijian phase at several sites like Kalibangan, Banawali, Kunal, Bhirrana, Rakhigarhi etc.

Post Neolithic-Chalcolithic cultures of the Vindhyan region, on the basis of analysis of pottery has been divided into two groups, representing two successive stages (Sharma 1980: 78; Pal 1986: 141). The first stage is represented by Kokoria group of sites, mostly confined to the Chandraprabha and Karamnasa river valleys in former Varanasi district. The Second stage is represented by Koldihwa group of sites, located mostly in Allahabad and Mirzapur districts. However, settlements of the First Stage chalcolithic culture is also noticed in Allahabad district at Panchoh and Betaubir and Magha in Mirzapur district.

Stage I: The Kokoria group of sites are characterized by the occurrence of unpainted black-and-red, black slipped and red wares. But the most significant feature of this culture is their association with burials in the form of megaliths. In ceramic complex its distinctive feature is the introduction of specific types of dishes, not known in other Chalcolithic cultures particularly characterized by the painted black-and-red ware such as Ahar or Narhan culture, but subsequently become the hall mark of all the Iron Age cultures all over India. Moreover, the occurrence of surviving OCP ceramic tradition in this cultural phase makes this stage as a period of 'Cultural Convergence' indicating social synthesis of earlier ethnic groups or heterogenous nature of social composition comprising proto-Australoids, Veddoids, Mongoloids and autochthonous original Mesolithic dolicocranic people.

Stage-II: The pottery types of the Koldihwa (Pal 1986: 141) group is superior to that of Kokoria group in fabric, finish and firing. Almost all the wares along with most of the shapes and decorative patterns of the Kakoria group survive in the second stage. Important new shapes are: dish-on-stand with plain or corrugated stem, pan with strap handles, dish with externally leveled and thickened rims, small vase with biconvex profile and vessels with elongated conical profile and pointed base. Occurrence of paintings on red, black-and-red and black slipped wares of Koldihwa group is the new and distinctive feature which was entirely absent in the ceramic assemblage of Kokoria.

There are two phases of Chalcolithic cultures of the Sarayupar region as well. The first is represented by Imlidih I and the second by the Narhan group (Singh 1994b). Probably the painting tradition of pottery introduced in Koldihwa group was borrowed from the cultures of the Saryupur region. The chronological bracket of the Post-Neolithic Chalcolithic cultures including the two stages may be placed between 3000 to 2000 BC The dates for the Chalcolithic deposits (2

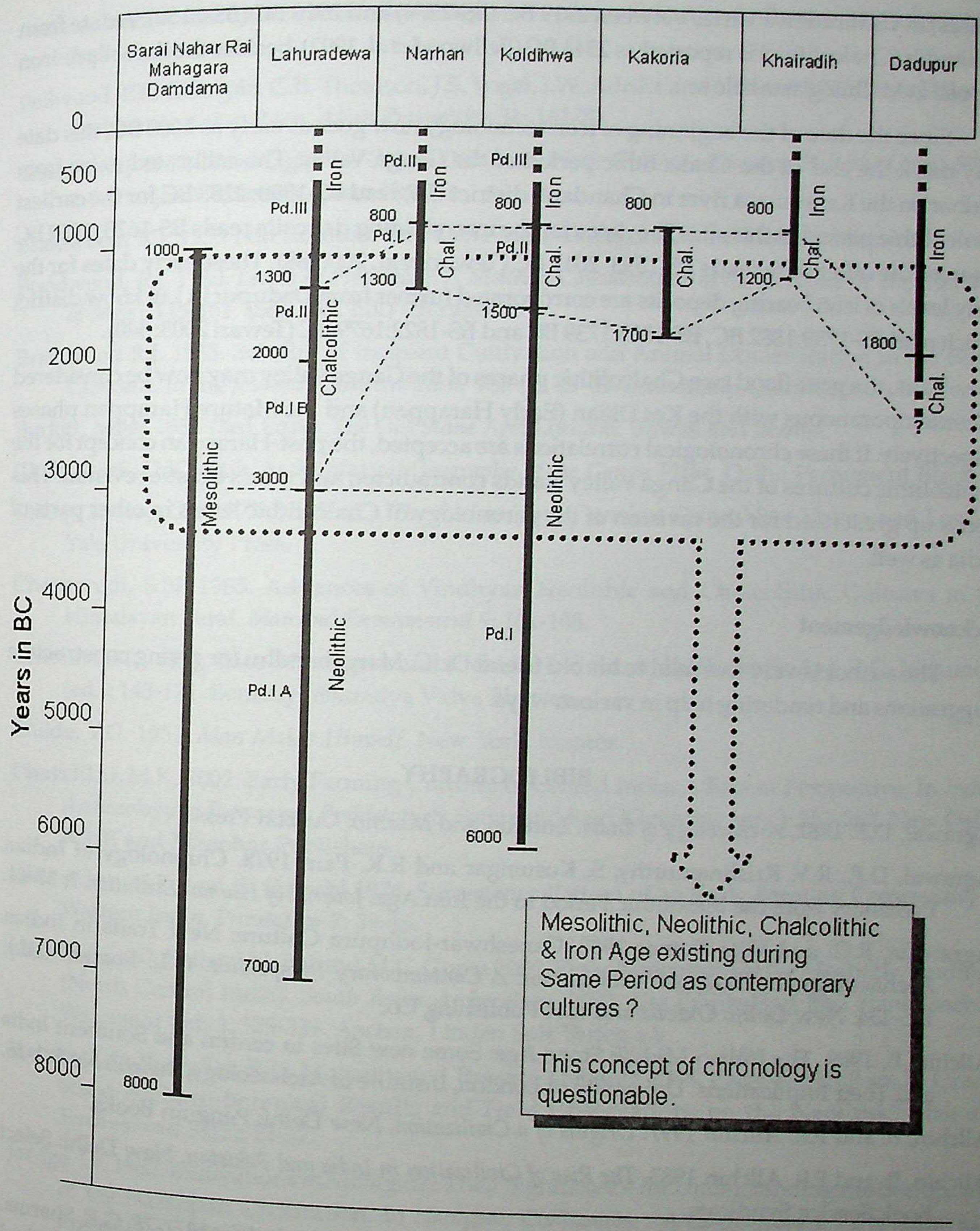


Fig. 1. Chronology as presently accepted

phases) at Lahuradewa varies between 2919 BC (BS-2274) and 2010 BC (BS-2150). A date from Khairadih (Chalcolithic) is reported as 2544 BC (Bellwood *et al*. 1992), besides the date of pre-iron deposit at Malhar given below.

Since the date of the beginning of iron technology now goes as early as 2000 BC, this date may mark the end of the Chalcolithic period of the Ganga Valley. The calibrated dates from Malhar on the Karamnasa river in Chandauli district U.P. read BS-1590: 2283 BC for the earliest Chalcolithic period at this site. The dates for the iron yielding deposits reads BS-1623; 1882 BC whereas the other date reads BS-1593: 2012 BC (Tewari *et al*. 2000:88). These early dates for the early levels of iron bearing deposits are corroborated further from Dadupur in Lucknow district which read BS-1759:1882 BC, BS-1825:1739 BC and BS-1822:1679 BC (Tewari 2003: 540).

Thus, the post-flood two Chalcolithic phases of the Ganga valley may now be considered as contemporaneous with the Kot Dijian (Early Harappan) and the Mature Harappan phases respectively. If these chronological correlations are accepted, the post-Harappan concept for the Chalcolithic cultures of the Ganga valley stands contradicted and needs drastic revision. This opens up great need for the revision of the chronology of Chalcolithic levels in other parts of India as well.

Acknowledgement

The author is very thankful to his old friend Dr. C. Margabandhu for giving constructive suggestions and rendering help in various ways.

BIBLIOGRAPHY

Agrawal, D.P. 1982. *Archaeology of India*. London and Marmo: Curzon Press.

Agrawal, D.P., R.V. Krishnamurthy, S. Kusumgar and R.K. Pant 1978. Chronology of Indian Prehistory from the Mesolithic Period to the Iron Age. *Journal of Human Evolution* 7: 37-44.

Agrawala, R.C. and Vijai Kumar 1982. Ganeshwar-Jodhpura Culture: New Traits in Indian Archaeology. In *Harappan Civilization: A Contemporary Perspective*. G.L. Possehl (ed.): 125-134. New Delhi: Oxford and IBH Publishing Co.

Allchin, B. 1959. The Indian Middle Stone Age: Some new Sites in central and Southern India and Their Implications. University of London, Institute of Archaeology, *Bulletin* No.2: 1-36.

Allchin, B. and F.R. Allchin 1997. *Origins of a Civilization*. New Delhi: Penguin Books.

Allchin, B. and F.R. Allchin 1983. *The Rise of Civilization in India and Pakistan*. New Delhi: Select Book Service Syndicate.

Alur, K.R. 1980. Funal Remains from Vindhyas. In *Excavations at Mahadaha 1977-78*. G.R. Sharma, V.D. Misra, D. Mandal, B.B. Misra and J.N. Pal (eds.): 201-230. Allahabad: Allahabad University.

Basu, A. and A. Pal 1980. *Human Remains from Burzhom.* Calcutta: Anthropological Survey of India.

Bellwood, P.R. Gillespic, G.B. Thomson, J.S. Vogel, I.W. Adrika and I. Datan 1992. New Dates for Prehistoric Asian Race. *Asian Perspective* 31: 161-70.

Bhan, Suraj 1967. New Light on Ochre Coloured Ware Culture. *Research Bulletin* (*Arts*) 57(3): 1-9 (Punjab University, Chandigarh).

Braidwood, R.J. 1959 (4th Edition). *Prehistoric Men.* Chicago: Natural History Museum.

Braidwood, R.J. 1960. *Levels in Prehistory: A Model of Consideration of the Evidence in The Evolution of Man* : 143-151. (Sol. Tax. Ed.) Chicago.

Braidwood R.J. 1983. Sub-Era of Incipient Cultivation and Animal Domestication in the Fertile Crescent. in the *Journal of Central Asia*, Vol. (I): 29-40. Islamabad: Quaide Azam University.

Burkitt, Miles 1955 (3rd Edn.). *The Old Stone Age.* London: Bowes and Bowes.

Chakrabarti, D.K. 2001. *Archaeological Geography of the Ganga Plain*, Delhi: Permanent Black.

Chang, Kwang Chi 1977 (3rd Edn.). *The Archaeology of Ancient China.* New Haven and London: Yale University Press.

Chaturvedi, S.N. 1985. Advances of Vindhyan Neolithic and Chalcolithic Cultures to the Himalayan Tarai. *Man and Environment* 9: 101-108.

Chatterji, S.K. 1988. Race-Movement and Prehistoric Culture. In *The Vedic Age.* R.C. Majumdar (ed.): 143-171. Bombay: Bharatiya Vidya Bhawan.

Childe, V.G. 1951. *Man Makes Himself.* New York: Mentor.

Dhavalikar, M.K. 2002. Early Farming Cultures of Central India. A Recent Perspective. In *Indian Archaeology in Retrospect: Prehistory*. S. Settar and Ravi Korisettar (eds.): 253-262. New Delhi: ICHR and Manohar Publishers.

Dhavalikar, M.K. and G. Possehl 1974. Subsistence Pattern of an Early Farming Community of Western India. *Puratattva* 7: 39-46.

Harvey, E.L., D. Fuller, J.N. Pal and M.C. Gupta 2005. Early Agriculture of the Neolithic Vindhyas (North Central India). *South Asian Archaeology*, 2003. Ute FrankeVogt and Hans Joachim Weisshaor (eds.): 329-334. Aachen, Linden Soft Verlog e.k.

Harvey, E.L., D. Fuller, R.K. Mohanty and Basanta Mahanta 2006. Early Agriculture in Orissa: Some Archaeo-botanical Results and Field Observations on the Neolithic. *Man and Environment* 31(2): 21-32.

Jarrige, J.F. 1982. Excavations at Mehrgarh: Their Significance for Understanding the Background of the Harappan Civilization. In *Harappan Civilization : A Contemporary Perspective.* G.L. Possehl (ed.): 79-84. New Delhi: Oxford and IBH Publishing Co.

Kajale, M.D. 1990. Some Initial Observations in Palaeobotanical Evidence for Mesolithic Plant Economy from Excavations at Damdama, Pratapgarh, U.P. In *Adaptation and Other Essays*. N.C. Ghosh and S. Chakrabarti (eds.): 98-102. Santiniketan: Vishwa Bharati.

Kennedy, K.A.R. 2002. Palaeoecological Factors in the Relative Isolation of Population in the Indian Mesolithic. In *Mesolithic India*. V.D. Misra and J.N. Pal (eds.): 67-81. Allahabad: University of Allahabad.

Kennedy, K.A.R. 2003. *God Apes and Fossil Men: Paleoanthropology in South Asia* Michigan: Michigan University Press.

Korisettar, Ravi, P.C. Venkatasubbaiah and Dorian Q. Fuller, 2002. Brahmagiri and Beyond. The Archaeology of Southern Neolithic. in *Indian Archaeology in Retrospect*, S. Settar and Ravi Korisettar (eds.): Vol. I: Prehistory: 151-225. New Delhi: ICHR and Manohar Publishers.

Krishnaswami, V.D. 1953. Progress in Prehistory. *Ancient India* 9: 53-79.

Krishnaswami, V.D. 1962. The Neolithic Pattern of India. *Ancient India* 16: 25-64.

Kumar, Krishna 1991. The Copper-Hoard OCP Culture in the Mid Ganga Valley: an Appraisal in the Light of New Discoveries. In *Indian Archaeological Heritage*. C. Margabandhu *et al.* (eds.): 155-162. Delhi: Agam Kala Prakashan.

Lal, B.B. 1970-71. A. Deluge, Which Deluge? *Puratattva* 5:101.

Lal, B.B. 2005. Can the Vedic people be Identified Archaeologically?: An Approach. *Indologica Tourinesia* 30: 173-194.

Lal, B.B. and K.N. Dikshit 1979-80. Sringverpur: A Key Site for the Protohistoric and Early History of the Central Ganga Valley. *Puratattva* 10: 1-8.

Liversage, D. 1992. On the Origins of the Ganges Civilization. *Man and His Culture*. Peter Bellwood (ed.): 245-266. New Delhi: Books and Books

Lubbock, Sir John 1865. *Prehistoric Times as Illustrated by Ancient Remains and the Manners and Customs of Modern Savages*. London: Williams and Norgate.

Mandal, D. (n.d.) Neolithic Culture of the Vindhyas. Excavations at Mahagara in the Belan Valley. Paper read at the *Annual Conference of IAS and ISPQS* in 1980 at Allahabad.

Mani, B.R. 2005. Pre-Harappan Village Settlements and Early Farming Communities in Northern South Asia (c. 9th – 4th millennia BC). *Puratattva* 35: 7-20.

Masson, V.M. and V.I. Sarianidi 1977. *Central Asia*. New York.

Misra, V.D. 1977. *Some Aspects of Indian Archaeology*. Allahabad: Prabhat Prakashan.

Misra, V.D. 1997. The Chalcolithic Middle Ganga Valley. In *Art, Archaeology and Culture of Eastern India*: C.P. Sinha (ed.): 54-63. Patna: Bihar Puravid Parishad.

Misra, V.D. 2002. Origin, Chronology and Transformation of the Mesolithic Culture in India in *Mesolithic India*. V.D. Misra and J.N. Pal (eds.): 447-464. Allahabad: Allahabad University.

Misra, V.D. 2007. Stone Age Cultures, Their Chronology and Beginning of Agriculture in North-Central India. *Man and Environment* 32(1): 1-14.

Misra, V.D., J.N. Pal and M.C. Gupta. n.d. Excavations at Tokwa: New Evidence of Early Farming Culture in the Vindhyas (Electrostat Copy).

Misra, V.D., J.N. Pal and M.C. Gupta 2001. Excavations at Tokwa: A Neolithic Chalcolithic Settlement. *Pragdhara* 11: 59-72.

Misra, V.N. 1973a. Problems of Palaeo-Ecology, Palaeo-Climate and Chronology of Microlithic Cultures of North Western India in *Radiocarbon and Indian Archaeology*. D.P. Agrawal and A. Ghosh (eds.): 58-72. Bombay: TIFR.

Misra, V.N. 1973b. Bagor: A Late Mesolithic Settlement in North-West India. *World Archaeology* 6: 92-110.

Moore, A.M.T. 1982. Agricultural Origins in the Near East: A Model for 1980's. *World Archaeology* 14(2): 224-236.

Pal, J.N. 1986. *Archaeology of Southern Uttar Pradesh*, Allahabad: Swabha Prakashan.

Pal, J.N. 1997. Neolithic Cultures of the Northern Vindhyas and of the Middle Gangetic Plain. In *Art, Archaeology and Culture of Eastern India*. C.P. Sinha (ed.): 35-44. Patna: Bihar Puravid Parishad.

Pal, J.N. 2006. The Early Farming Culture of Middle Ganga Plain with Special Reference to the Excavations at Jhusi and Hetapatti. *Paper (Electrostat copy) submitted for the publication in the proceedings of the Seminar on Global Agriculture held at Lucknow on 18-20 Jan. 2006.*

Possehl, G.L. 1988. Radiocarbon Dates from South Asia. *Man and Environment* 12: 169-196.

Possehl, G.L. and P.C. Rissman 1992. The Chronology of Prehistoric India from Earliest Times to the Iron Age, *Chronologies of Old World Archaeology*. R.W. Ehrich (ed.) Vol. I: 465-490; Vol. II: 447-474. Chicago and London: The University of Chicago Press.

Pusalker, A.D. 1988. Traditional History of the Earliest Times to the Accession of Parikshit. In *The Vedic Age*. R.C. Majumdar (ed.): 271-322. Bombay: Bharatiya Vidya Bhawan.

Rao, L.S., Nandini B. Sahu, Prabash Sahu, Samir Diwan and U.A. Sastry 2005. New Light on the Excavation of Harappan Settlement at Bhirrana. *Puratattva* 35: 60-68.

Sahi, M.D.N. 1985. Antiquity of Food Production: A Survey of New Evidence. *Proceedings of the Indian History Congress*: 116-126. Amritsar Session.

Sahi, M.D.N. 1994. *Aspects of Indian Archaeology*. Jaipur: Publication Scheme.

Sahi, M.D.N. 2005a. Genesis of the Harappan Civilization In *A Discussion on Indo-European Language and Culture*. D.N. Tripathi (ed.): 216-246. New Delhi: ICHR and Manak Publications Pvt. Ltd.

Sahi, M.D.N. 2005b. Early Interactions Between Cultures of the Mid Ganga Valley and Western India. *Pragdhara* 15: 91-108.

Sahi, M.D.N. 2006. Ochre Coloured Pottery: Further Investigations into its Earliest Chrono-Cultural Horizon. In *Mahasenasiri : Riches of Indian Archaeological and Cultural studies.* P. Chenna Reddy (ed): 50-73. Delhi: Sharada Publishing House.

Sahi, M.D.N. 2007. OCP: Its Late Harappan Concept Re-examined. *Puratattva* 37: 155-166.

Sahi, M.D.N. (n.d.). Source of Fifth and Fourth Millennium Copper at Mehrgarh and Bagor. *Paper presented at the Annual Conference of ISPQS at Tirupati in 2003* (Summary of Papers).

Sali, S.A. 1996. Neolithic of Maharashtra. In *Spectrum of Indian Culture.* C. Margabandhu and K.S. Ramchandran (eds.): 44-54. Delhi: Agam Kala Prakashan.

Sankalia, H.D. 1965. *Excavations at Langhnaj* 1944-63. Part-I: Archaeology. Poona: Deccan College Post-Graduate and Research Institute.

Sankalia, H.D. 1969. *Mesolithic and Pre Mesolithic Industries from the Excavations at Sangankallu,* Bellary: 1965. Poona: Deccan College Post-Graduate and Research Institute.

Saraswat, K.S. 2000. *Annual Report: Birbal Sahni Institute of Palaeobotany* (1999-2000): 24-25. Lucknow: Birbal Sahni Institute of Palaeobotany.

Saraswat, K.S. 2005. Agricultural Background of the Early Farming Communities in the Middle Ganga Plain. *Pragdhara* 15: 145-177.

Sharma, A.K. 1985. Comments on Cultural Ecology of the Neolithic in India by A. Sundara. In *Recent Advances in Indian Archaeology.* S.B. Deo and K. Paddayya (eds.): 51-52. Poona: Deccan College Post-Graduate and Research Institute.

Sharma, A.K. 1991. Neolithic Gufkral. In *Indian Archaeological Heritage.* C. Margabandhu *et al.* (eds.): 101-110. Delhi : Agam Kala Prakashan.

Sharma, D.V. 2001-2002. A Report on Excavations at Madarpur: A Copper Hoard Site, Uttar Pradesh. *Puratattva* 32: 33-35.

Sharma, G.R. 1980. *From History to Prehistory*. Allahabad: Kharbanda offset.

Sharma, G.R., V.D. Misra, D. Mandal, B.B. Misra and J.N. Pal 1980a. *Beginnings of Agriculture.* Allahabad: University of Allahabad.

Sharma, T.C. 1981. Neolithic Pattern of North Eastern India. In *Madhu: Recent Researches in Indian Archaeology in Art History.* M.S. Nagraja Rao (ed.): 41-52. Delhi: Agam Kala Prakashan.

Singh, B.P. 1989. Khairadih – A Chalcolithic Settlement. *Puratattva* (1987-88). 18: 28-34.

Singh, B.P. 1997. Neolithic and Chalcolithic Pottery of the Middle Ganga Plain: A Case Study of Senuwar. In *Ancient Ceramics.* P.C. Pant and Vidula Jayaswal (eds.): 3-33, Delhi: Agam Kala Prakashan.

Singh, B.P. 2004. *Early Farming Communities of Kaimur Excavations at Senuwar.* Jaipur: Publication Scheme.

Singh, Gurdip, R.D. Joshi, S.K. Chopra and A.B. Singh 1974. Late Quaternary History of Vegetation and Climate of Rajasthan Desert, India. *Philosophical Transactions of the Royal Society of London, Biological Science* 267/889: 467-501.

Singh, P. 1974. *Neolithic Culture of Western Asia.* London: Seminar Press.

Singh, P. 1985. Comments on Cultural Ecology of the Neolithic in India by A. Sundara. In *Recent Advances in India Archaeology.* S.B. Deo and K. Paddayya (eds.): 52-53. Poona: Deccan College Post-Graduate and Research Institute.

Singh, P. 1993. Archaeological Excavations at Imlidih Khurd – 1992. *Pragdhara* 3: 21-35.

Singh, P. 1994. Further Excavations at Imlidih Khurd – 1993. *Pragdhara* 4: 41-48.

Singh, P. 1994a. *Excavations at Narhan* – 1984-89. Varanasi and New Delhi: Banaras Hindu University and BR Publishing Corporation.

Singh, P. 1994b. Further Excavations at Imlidih Khurd 1993. *Pragdhara* 4: 41-48.

Singh, P. 1994-95. Excavations at Imlidih Khurd – 1992. *Bharati* 23: 1-9.

Singh, P. 2002. The Neolithic Cultures of Northern and Eastern India. in *Indian Archaeology in Retrospect : Prehistory. Archaeology of South Asia* Vol. I. S. Settar and Ravi Korisettar (eds.): 127-150. New Delhi: ICHR and Manohar Publishers.

Singh, P. 2003. Archaeology of Middle Ganga Plain. *Man and Environment* 28(1): 1-6.

Sinha, B.K. 1996. Excavations at Golbai Sasan, District Puri, Orissa of *Spectrum of Indian Culture.* C. Margabandhu and K.S. Ramchandran (eds): 55-60. Delhi: Agam Kala Prakashan.

Sinha, H.P. 1994. *Archaeological and Cultural History of Bihar* (with special reference to Neolithic Chirand) New Delhi: Ramanand Vidya Bhawan.

Sonawane, V.H. 2002. Mesolithic culture of Gujarat. In *Mesolithic India.* V.D. Misra and J.N. Pal (eds.): 104-153. Allahabad: University of Allahabad.

Subrahmanyam, R. 1975. *Nagarjunakonda* (1954-60). Vol. I. New Delhi: Archaeological Survey of India.

Tewari, R. 2003. The Origin of Iron Working in India: New Evidence from the Central Ganga Plain and the Eastern Vindhyas. *Antiquity* 77: 536-545.

Tewari, Rakesh, R.K. Srivastava, K.K. Singh, K.S. Saraswat and I.B. Singh 2003. Preliminary Report on the Excavations at Lahuradeva, District Sant Kabir Nagar, U.P. 2001-2002: Wider Archaeological Implications. *Pragdhara* 13: 37-68.

Tewari, R., R.K. Srivastava, K.K. Singh, K.S. Saraswat 2006a. Further Excavation at Lahuradewa, District Sant Kabir Nagar (U.P.) 2005-06: Preliminary Observations. *Puratattva* 36: 68-75.

Tewari, R. R.K. Srivastava, K.K. Singh, K.S. Saraswat, I.B. Singh, M.S. Chauhan, A.K. Pokharia, A. Saxena, V. Prasad and M. Sharma 2006b. Second Preliminary Report of the Excavations at Lahuradewa, District Sant Kabir Nagar, UP. 2002-2003-2004 and 2005-06. *Pragdhara* 16: 35-68.

Thapar, B.K. 1974. Problems of the Neolithic Culture in India: A Retrospect. *Puratattva* 7: 61-64.

Thapar, B.K. 1984. Fresh Light on the Neolithic Culture of India. *Puratattva* (1981-83) 13-14: 37-44.

Thapar, Romila 1987. *Ancient Indian Social History*, New Delhi: Orient Longman Ltd.

Thomas, P.K., P.P. Joglekar, V.D. Misra, J.N. Pandey and J.N. Pal 2002. Faunal Remains from Damdama: Evidence for the Mesolithic Food Economy of the Gangetic Plain. In *Mesolithic India*. V.D. Misra and J.N. Pal (eds.): 366-380. Allahabad: University of Allahabad.

Varma, R.K. 2002. Mesolithic Technology. In *Mesolithic India*. V.D. Misra and J.N. Pal (eds.): 347-355. Allahabad: University of Allahabad.

Verma, B.S. 1971. Excavations at Chirand: New Light on Indian Neolithic Complex. *Puratattva* 4: 19-24.

V.D. MISRA & PRAGYA MISRA

Neolithic Culture of the Middle Ganga Valley

The Middle Ganga Valley (24⁰ 30′ N — 27⁰ 50′ N and 81⁰ 47′ E - 87⁰ 50′ E) measuring about 144,409 sq km has been a distinct cultural and economic entity even though not a clearly defined physical unit (Singh 1971: 183). Bounded by the Himalayas in the north, the Vindhyas in the south, the Ganga-Yamuna confluence in the west and Bihar-Bengal border in the east, it includes modern eastern Uttar Pradesh and plain of Bihar. On the basis of river system the region is sub-divided into the Ganga plain north and Ganga plain south. The former is further sub-divisible into (i) the Ganga-Ghaghara doab, (ii) the Ghaghara-Gandak interfluve, (iii) Gandak-Kosi interfluve and (iv) Kosi-Mahanadi interfluve, and the latter, *i.e.*, the Ganga plain south into (i) west of Karmanasa, (ii) Karmanasa east interfluve, (iii) lower Son valley and finally (iv) the Magadha-Anga plain (Singh 1971: 190-92). Needless to say that the Ganga constitutes the life-line of the area under discussion.

The middle Ganga plain has been the cradle of Indian culture and civilization. From the time immemorial it has been a meeting point of different cultures, creeds and races. Elasticity in thought and action has been the hallmark of people inhabiting the area. The divine gospels contained in some of the *Upanisads* were conceived and preached in this region. It had the privilege of hearing the philosophical discussions of *Yagyavalkya* and others. It is the land associated with the story of *Ramayana*. The deductive portions of the *Mahabharata* are supposed to have got their final shape in this region. The area was the nerve center of the political, economic and religious upheavals of 6th century BC. It witnessed the emergence of second urbanization in India. Mahavira and Gautam Buddha were not only born in this region, they also delivered their sermons to the people of this area. From 6th century BC onward, the middle Ganga valley played a crucial role in the shaping of the political history of India. It is said that right from the time of Bimbisara to that of Ashoka, the history of the middle Ganga valley was the history of India. This region is credited to have witnessed the rise of two empires — the Mauryan Empire and the Gupta Empire.

Viewed against such an illustrious history, tradition and legend as outlined above, the recorded archaeological relics of the region up to the fifties of the 20th century looked prosaic. The Northern Black Polished ware appeared to be the earliest cultural relic of man discovered in the middle Ganga plain. However, the archaeological investigations conducted over the last six decades under the auspices of the Department of Ancient History, Culture and Archaeology, University of Allahabad; the Department of Ancient Indian history, Culture and Archaeology, Banaras Hindu University; the Department of Ancient History, Archaeology and Culture, Deen Dayal Upadhyaya University of Gorakhpur; Department of Ancient Indian History, Patna University on the one hand and State Departments of Archaeology, Governments of Uttar Pradesh and Bihar and Archaeological Survey of India on the other have brought to light the relics of human cultures ranging from the late upper Palaeolithic to the early historical periods through Mesolithic, Neolithic and Chalcolithic covering a time range from the terminal Pleistocene to the first half of first millennium BC.

For a long time, the Neolithic culture was supposed to have five characteristic features: polished celts, pottery, sedentary settlement, domestication of animals and cultivation of cereals. However, in the light of subsequent findings from Greece (Christopoulos 1974), Turey, western Asia, Iran, Afghanistan (Singh 1991; Srivastava 1982: 45-46 and 212-216) and north-western Indian sub-continent (Asthana 1985: 110-120, Misra 1999: 240-241) the polished celts and pottery are no longer essential components of the Neolithic culture. There are Neolithic sites scattered over a vast stretch of land in which only the three traits, *i.e.*, sedentary settlement, domestication and cultivation are available.

In India it was Sir Mortimer Wheeler (1948) who through his excavations at Brahmagiri put the Neolithic culture in proper perspective. Subsequent archaeological investigations in different parts of the country revealed not only the wide spread of the culture but also regional variations as well. During the last fifty years various scholars have made concerted efforts for grouping of the Neolithic culture of Indian sub-continent. V.D. Krishnaswami (1965: 25-64) divided it into four geographical regions:

A. Central and Western India

B. Southern India

C. Eastern India

D. Kashmir

Thapar (1965) grouped them into three geographical units: northern, southern and eastern. While Allchin (Allchin and Allchin 1968) taking the distribution and peculiarities of the Neolithic axes into consideration proposed a five-fold grouping of the Neolithic cultures of India: (i) northern, (ii) southern, (iii) eastern, (iv) central and (v) eastern-central. Thapar (1984: 37) while updating the issue and taking into consideration the whole of Indian sub-continent regrouped the Neolithic cultures into six geographical regions: (i) north-western, (ii) northern, (iii) north-eastern, (iv) central-eastern, (v) mid-eastern and (vi) southern. Subsequently a new Neolithic zone spread over the Vindhyan plateau comprising Allahabad and Mirzapur in Uttar Pradesh and Rewa and Sidhi in Madhya Pradesh was, also brought to light. The available archaeological material gives a distinct personality to the Neolithic culture of the north-central Vindhyas (Misra 1977: 107-121; Sharma and Mandal 1980: 130-200; Pandey 1988: 128-138; Misra 1999: 244-246).

In the following pages an attempt is being made to bring out the salient features of the Neolithic culture of the mid Ganga valley.

The explorations conducted in the mid Ganga valley over the last five decades have resulted not only in identifying Neolithic culture in this region but also in bringing out the salient features of the same. Sites pertaining to the Neolithic culture have been reported from Basti, Siddharth Nagar, Sant Kabir Nagar, Gorakhpur, Ballia and Allahabad districts of Uttar Pradesh and Saran, Vaishali, Patna, Gaya and Rohtas districts of Bihar. The important excavated sites in Uttar Pradesh include Jhusi (Misra *et al*. 2003: 227-230) and Hetapatti (Pal and Gupta 2005: 163-168) in Allahabad, Bhunadih (Singh and Singh 1997-98: 12-29) and Waina (Singh and Singh 1995-96: 41-61) in Ballia, Sohagaura (*IAR* 1974-75: 46-47; Chaturvedi 1985: 101-108) and Imlidih Khurd (Singh 1992-93: 21-36; Singh 1993-94: 41-48; Singh *et al*. 1992: 120-122) in Gorakhpur and Lahuradeva (Tewari *et al*. 2002: 54-62; Tewari *et al*. 2003: 37-68; Tewari *et al*. 2005: 40-43) in Sant Kabir Nagar, while Chirand (*IAR* 1981-82: 13-14; Verma 1971: 19-24; Narain 1970: 16-35; Verma 1998; Sinha 1994; Roy 1989: 103-105) in Saran, Chechar Kutubpur (*IAR* 1977-78: 17-18) in Vaishali, Taradih (*IAR* 1984-85: 9-10) in Gaya and Senuwar (Singh 1990: 6-18, 1997: 3-33, 2004) in Rohtas in Bihar. Most of these excavated sites are multi-culture sites having yielded archaeological relics ranging from Neolithic to early historical periods.

All the excavated sites are located near some water bodies. These may be rivers, rivulets, or horse-shoe lakes (as in the case of Lahuradeva). The size of total settlement is moderate. The thickness of the occupational strata ranges from 45-50 cm to about 2 m.

The excavations, though conducted on a limited scale, have brought to light evidence of wattle and daub structures. Traces of post-holes have been noticed. The screen walls of huts were made of split bamboo and reed, the impressions of which have been preserved on burnt clay lumps. At Chirand, the evidence of pit dwelling has also been reported. The hutments appear to be round or oval on plan. Evidence or the use of bricks, baked or unbaked, has not been obtained from any of the sites. Of the other structural remains mention may be made of hearths, pits and silo probably for keeping grains.

The excavations have brought to light enormous data pertaining to the ceramic industry. The available evidence indicates that in the early stage of the culture, as indicated at Chirand, Lahuradeva, Jhusi and Hetapatti, people were using hand made pottery but subsequently the slow wheel appears to have been used for the purpose. The ceramic assemblage includes ordinary red ware, lustrous red ware, burnished ware (red, black and grey), rusticated ware, black-and-red ware and corded ware. The clay used for manufacturing the pots is not levigated. It contains grits, husks and chaff as degraissant. Pots are generally ill fired and have black core. Pottery types exhibit variety suggesting thereby that these were put to different uses. Pot forms include bowls (pedestalled, wide mouthed, channeled, etc.) with varying profile, vases, vessels, basins, miniature jars, *handis*, etc. The cording exhibits dozen of patterns. Spouted vessels have also been obtained. Some of the pots were made in two parts separately — the lower portion and the rim portion and subsequently these were luted together. Occurrence of painted sherds has been reported from Imlidih Khurd, Lahuradeva, Chirand and Senuwar. The post firing paintings of Chirand and Senuwar are confined to the rim and have been executed in red ochre. At Chirand the painted motifs consist of linear designs of criss-cross lines and concentric circles. At Imlidih Khurd painting executed in white red pigment over a bright slip has been reported. Multiple brush technique has been employed. Post firing scratching by sharp instrument is another feature of decorating the pots. Often these scratchings result in geometric patterns such as opposed triangles within concentric circles and floral motifs. Pots with applique bands have also been reported. On these applique are executed chain and rope patterns or incised decorations. In this connection it may be pointed out that applique patterns are confined to big pots like *handis*, etc.

From some of the excavated sites like Jhusi, Hetapatti, Chirand, Taradih, Senuwar, etc. stone objects have been found in appreciable number. These include blades, bladelets, scrapers, arrowheads, serrated points, triangles, lunates, borers, flakes, etc. From Hetapatti a number of cores have also been obtained. These artifacts have been fashioned on chert, chalcedony, agate, jasper, quartz, etc. Rounded celts of basalt and granite have also been reported from Chirand and Senuwar. A celt of basalt was obtained from Lahuradeva in course of a tube-well digging (Tripathi 2003: 70). Fragments of querns, mullers, balls, hammer stones, etc. fashioned on sand stone or quartzite are other stone objects found from excavated sites.

Bone objects constitute a salient feature of some of the excavated sites. Excavations at Chirand have yielded such objects in plenty. These include celts, scrapers, chisels, hammers, needles, points, borers, awls, shaft straighteners, styli and arrowheads. Bone ornaments like pendants, ear-rings, bangles, discs, combs, etc. have also been obtained from the site. Bone points have also been fond at Imlidih Khurd, Senuwar, Lahuradeva and Jhusi.

Beads of steatite, agate, and faience along with the terracotta beads have also been obtained from some of the excavated sites. Pottery discs are of common occurrence. Chirand has yielded terracotta wheels, beads, bangles, cakes, birds, serpents, etc.

Excavations conducted at Chirand, Senuwar, Imlidih Khurd, Lahuradeva and Jhusi have thrown welcome light on the corpus of cereals having been cultivated by the Neolithic people of the mid Ganga valley. The available evidence indicates that in the beginning people were cultivating rice and small millets. In this connection it may be pointed out that grains of rice in association with highly carbonized and mutilated grains of grass have been found in good number. Both wild (*Oryza rufiprogan*) and domesticated varieties (*Oryza sativa*) have been identified at Lahuradeva. Among the wild grasses identified at the site (Lahuradeva) mention may be made of foxtail grass. Along with rice, hulled and single row barley, bread wheat and dwarf wheat, *jowar* millet and pearl millet have been reported from Imlidih Khurd. To this site also goes the credit of cultivating not only lentil, green gram, field pea and grass pea but also brassica and sesame. Seeds of jujube, amalaka and grapes have also been identified at the site. A casual glace on the list of cultivated grains indicates that they were producing both rainy season and winter crops. This suggests that during the Neolithic period dialogue between east and west had been established in India. Otherwise, we would not be able to explain the presence of wheat, barley, lentil, field pea, etc. at the Neolithic levels of the mid Ganga valley. However, the available evidence suggests that rice was the staple food of the people.

A corpus of animal bones has been obtained from the excavated Neolithic sites. These include bones of cattle, buffalo, sheep, goat, pig, elephant, rhinoceros, stag, deer, etc. Of these cattle, buffalo, sheep, goat and pig were domesticated. Bones of aquatic creatures like turtle and fish and those of birds have also been obtained. The available evidence would suggest that besides domestication, hunting and fishing was, also resorted to for augmenting the dietary items.

For computing the chronology of the Neolithic culture of the mid Ganga valley, the following points deserve attention:

(I) Stratigraphically the Neolithic culture of mid Ganga valley underlies the Chalcolithic culture often without cultural break.

(II) The Neolithic of the mid Ganga valley is divisible into two sub-groups. The early phase as reported at Jhusi, Hetapatti, Lahuradeva, etc. is characterized by hand made pottery.

(III) The corded and rusticated wares constitute the hallmarks of the Neolithic culture of the mid Ganga valley.

(IV) Some of the excavated sites of the area under discussion have yielded celts, microlithic tools and bone tools without any reference to copper objects. Of the early excavated sites such evidence has been unearthed from Chirand, Taradih and Senuwar. The recent excavations at Jhusi and Hetapatti have yielded microliths in good number indicating thereby that these tools played an important role in the Neolithic culture of the sites concerned.

(V) All the excavated sites exhibit primitive character of structures. Hutments, round or oval on plan are detected. The available evidence indicates the wattle, and daub structure. As indicated earlier, no evidence of the use of baked or unbaked bricks has been obtained from any of the excavated sites.

(VI) Rice appears to have been staple diet of the people. It was supplemented by fish and meat. Besides cultivation and domestication, trapping, hunting and fishing also played an important role in the life of the Neolithic people of the mid Ganga valley.

(VII) Archaeological investigations carried out in parts of eastern Uttar Pradesh covering districts of Allahabad, Sant Ravidas Nagar, Varanasi, Jaunpur, Pratapgarh and Sultanpur have furnished ample evidence about the Epipalaeolithic and Mesolithic cultures once prevailing in this area. Often these tools are found in geological context. The excavations conducted at Sarai Nahar Rai, Mahadaha and Warikalan Damdama (all situated in Pratapgarh district) have brought to light not only human burials but also bones of contemporary fauna, along with pit hearths, microliths, bone tools and bone ornaments. The available ^{14}C dates from the Gangetic Epipalaeolithic and Mesolithic sites along with those of the Vindhyan sites would suggest a date bracket ranging from about 17000 BC to the first half of Holocene (5000 BC) (Lukacs *et al*. 1996: 301-311; Misra 1997: 32-38, 2005: 39-44; Jayaswal 2002: 82-90; Pal *et al*. 2004: 51-62).

(VIII) None of the excavated Mesolithic sites of the mid Ganga valley has produced evidence of cultivation or domestication. No pottery, even hand made, has been obtained from any of the excavated Mesolithic sites. The Mesolithic folk were still in hunting-gathering stage.

(IX) However, the occurrence of food processing equipments like quern, muller, etc. from the excavated Mesolithic sites both from the mid Ganga valley and the Vindhyas would suggest that by that time collection of wild cereals had started playing a vital role in the life of Mesolithic folk, otherwise the significance of the occurrence of such equipment, can not be easily explained. The nature of quasi-sedentary settlement in the context of Mesolithic sites would also indicate that by this time people had started living at some sites for considerable length of time. This would indicate that much before the emergence of the Neolithic culture both in the Vindhyas and in the mid Ganga valley ground for it was being prepared since long. The available evidence thus would suggest a comparatively high antiquity of the Neolithic culture of the mid Ganga valley.

Four excavated Neolithic sites of the mid Ganga valley have furnished ^{14}C dates also, on the basis of which a reliable chronology of the culture can be worked out. The sites in question are:

Chirand (Possehl and Rissman 1992: 463), Senuwar (Singh 1990: 18), Lahuradeva (Tewari *et al*. 2003: 54) and Jhusi. Two ^{14}C dates were obtained from Chirand read 1760±50 BC and 1680±135 BC. These dates push the beginning of the Neolithic culture at the site around 2000 BC. From the overlap phase (Neolithic and Chalcolithic) of Senuwar four dates reading 1770±120 BC, 1660±120 BC, 1500±110 BC and 1400±110 BC have been obtained. These dates would push back the antiquity of the Neolithic horizon at Senuwar earlier than 2000 BC. The recent excavations at Lahuradeva, a multi culture site, have furnished datable materials for the ^{14}C dates from the Neolithic horizon. These dates read 5320±90 BP (Cal. BC 4220, 4196, 4161) and 6290±160 BP (Cal. BC 5298). The second of these dates would put the beginning of the Neolithic culture at the site around the mid of 6th millennium BC. An AMS ^{14}C date for a carbonized domesticated rice husk pushes back the antiquity of the Neolithic culture at the site. The concerned sample measures around mid 7th millennium BC (Tewari *et al*. 2005: 40). In this connection it may be pointed out that the concerned horizon has yielded both botanical and faunal data in appreciable quantity. When fully analyzed, these are likely to throw some new light on the status of domestication and cultivation at the site during the Neolithic period. From the Neolithic horizon of Jhusi, another multi culture site over looking the Ganga-Yamuna confluence in Allahabad, three ^{14}C dates have been obtained (BSIP, Date nos. 2524, 2525, 2526). These read 6760±190 BP (Cal. BC 5660, 5649 and 5642), 7110±170 BP (Cal. BC 5990, 5938 and 5932) and 8140±220 BP (Cal. BC 7106, 7105, 7080) respectively. These dates would push back the antiquity of the Neolithic culture at Jhusi around the latter half of 8th millennium BC. In this connection it may be pointed out that excavations conducted at the site have brought to light a 1.5 m habitational deposit pertaining to the Neolithic culture. This deposit is characterized by hand made pottery comprising ordinary red ware, corded red ware, rusticated red ware, burnished red ware, burnished black ware and crude black-and-red ware; microliths, wattle and daub structures along with faunal and botanical remains in appreciable number. The combined testimony of the ^{14}C dates obtained from Lahuradeva and Jhusi would push back the antiquity of the Neolithic culture of the mid Ganga valley around the latter half of 8th millennium BC. These dates read along with the dates obtained from Mehrgarh in Baluchistan would suggest the existence of two regional centres for the beginning of agriculture in Indian sub-continent. One center was developing in the north-west with barley and wheat as major crops; the other was developing in the north-central Vindhyas and the mid Ganga valley with rice and small millet as main cereals.

The origin of the Neolithic culture of the mid Ganga valley is still in a melting pot. A number of Mesolithic sites in the area have been located and excavated but no site has yielded the evidence of two cultures, *i.e.*, Mesolithic and Neolithic in sequential order. For all practical purposes, the sedentary settlement in the mid Ganga valley starts with the onset of the Neolithic culture. The descent of man in the mid Ganga plain can be traced back to the Epipalaeolithic period around 17000 BC. But in the north-central Vindhyas the presence of man has been documented right from the Pleistocene. In this connection it may be pointed out that the archaeological investigations conducted in the north-central Vindhyas covering the valleys of the Belan and the Son have furnished evidence of human culture from Palaeolithic to Neolithic without interruption. Stone artifacts from lower Palaeolithic to Mesolithic have been found not only in developmental sequence but in geological context also. The lithic assemblages have been found in association with the fossilized fauna. The archaeological investigations in the Belan and Son valleys have placed the north-central Vindhyan region on the fossil map of India.

The available archaeological evidence would indicate that Stone Age man descended in the mid Ganga vàlley from the Vindhyan area. The cultural sequence of the mid Ganga valley as pointed out earlier starts from the Epipalaeolithic period. The lower, middle and early phase of upper Palaeolithic tools have not been reported so far in the middle Ganga valley.

The stone tools of Epipalaeolithic and Mesolithic periods of the mid Ganga valley are fashioned on chert, chalcedony, agate, carnelian, etc. These semiprecious stones could have been obtained from the Vindhyan region alone, as in the mid Ganga valley stone is not available. The Stone Age man in his new environment had to grapple with the problem of the non-availability of raw material for manufacturing tools as a result of which he was in search of a substitute. Necessity is the mother of invention. He started manufacturing tools out of bones. Thus a new facet was added to the Mesolithic culture of the mid Ganga valley. As far as the questions of origin of the Epipalaeolithic and Mesolithic cultures are concerned, it is a settled point. These originated in the north-central Vindhyan region. But what about the origin of the Neolithic culture of the mid Ganga valley?

An independent personality of the Neolithic culture of the north-central Vindhyas has long been established. The excavations conducted at Koldihwa, Mahagara and Panchoh in Allahabad, Indari and Tokwa in Mirzapur in Uttar Pradesh and Kunjhun in Sidhi district of Madhya Pradesh have furnished valuable information about the make up of the culture. It is characterized by hand made pottery comprising ordinary red, corded red, rusticated red, burnished red, burnished black and crude black-and-red wares, rounded celts, microliths, wattle and daub structures along with domestication and cultivation. In the early stage of the culture rice and small millets were being cultivated. Viewed against the Mesolithic culture particularly the late phase of the Mesolithic culture as represented at Chopani Mando, we find that the Neolithic and Mesolithic cultures share in common many a point, *i.e.*, hand made pottery, microliths, wattle and daub structures and sedentary settlement. From the late phase of the Mesolithic culture as evidenced from Chopani Mando, people had started collecting wild rice while in the Neolithic phase they started cultivating it. Thus there is a running theme between the Mesolithic and Neolithic. In the light of the above the Vindhyan origin of the Neolithic culture may be suggested. However, the final script on this vexed topic is yet to be written.

BIBLIOGRAPHY

Allchin, B. and F.R. Allchin 1968. *The Birth of Indian Civilization.* Harmondsworth: Penguin.

Asthana, Shashi 1985. *Pre-Harappan Cultures of India and the Borderlands.* New Delhi: Books and Books.

Chaturvedi, S.N. 1985. Advances of Vindhyan Neolithic and Chalcolithic Cultures to the Himalayan Tarai: Excavations and Explorations in the Saryupar Region in Uttar Pradesh. *Man and Environment* 9: 101-108.

Christopoulos, George, A. (ed.) 1974. *History of the Hellenistic World Prehistory and Protohistory.* Athens and London: Ekdotike Athenon and Heinemann.

Jayaswal, Vidula 2002. Cross-Cultural Interpretation of Microlithic Using Cultures of India. In *Mesolithic India.* V.D. Misra and J.N. Pal (eds.): 82-90. Allahabad: Department of Ancient History, Culture and Archaeology, University of Allahabad.

Krishnaswami, V.D. 1965. Neolithic Pattern in India. *Ancient India* 16: 25-64.

Lukacs, J.R., J.N. Pal and V.D. Misra 1996. Chronology and Diet in Mesolithic North India: A Preliminary Report of New AMS C^{14} dates, δ-C^{13} Isotope Values and Their Significance. In *Bioarchaeology of Mesolithic India: An Integrated Approach, Colloquium XXXIII* of the International Congress of Prehistoric and Proto historic Sciences. Gennadi E. Afanas'ev, Serge Cleuziou, John R. Lukacs, Maurizio Tosi (eds.): 301-311. Forli: ABACO Edizioni.

Misra, V.D. 1977. *Some Aspects of Indian Archaeology.* Allahabad: Prabhat Prakashan.

Misra, V.D. 1997. The Mesolithic Culture of the Vindhyas and the Ganga Valley with Special Reference to Environment and Chronology. In *Him-Kanti: Archaeology, Art and History.* Prof K.P. Nautiyal Felicitation Volume. B.M. Khanduri and Vinod Nautiyal (eds.): 32-38. Delhi: Book India Publications Co.

Misra, V.D. 1999. Agriculture, Domestication of Animals and Ceramic and Other Industries in Prehistoric India: Mesolithic and Neolithic. In *The Dawn of Indian Civilization up to 600 BC,* Vol. I, Part I. G.C. Pande (ed.): 233-266. New Delhi: PHISPS.

Misra, V.D. 2002. Origin, Chronology and Transformation of the Mesolithic Culture in India. In *Mesolithic India.* V.D. Misra and J.N. Pal (eds.): 447-464. Allahabad: Department of Ancient History, Culture and Archaeology, University of Allahabad.

Misra, V.D. 2005. Mesolithic Cultures in the Middle Ganga Valley. In *River Valley Cultures in India.* K.K. Chakravarty and G.L. Badam (eds.): 39-44. New Delhi: Indira Gandhi Rashtriya Manava Sangrahalaya, Bhopal and Aryan Books.

Misra, V.D., J.N. Pal and M.C. Gupta 2003. Further Excavations at Jhusi: Evidence of Neolithic Culture. *Pragdhara* 13: 227-229.

Narain, L.A. 1970. The Neolithic Settlement at Chirand. *The Journal of Bihar Research Society* 56: 16-35.

Pal, J.N. and M.C. Gupta 2005. Excavations at Hetapatti (Allahabad District): Some Preliminary Observations. *Journal of Interdisciplinary Studies in History and Archaeology* 2 (1): 163-168.

Pal, J.N., M.A.J. Williams, M. Jayaswal and A.K. Singhwi 2004. Infra Red Stimulated Luminescence Ages for Prehistoric Cultures in the Son and Belan Valleys, North Central India. *Journal of Interdisciplinary Studies in History and Archaeology*, 1 (2): 51-62.

Pandey, J.N. 1988. Northern Vindhyan Neolithic Settlement. In *Rural Life and Folk Culture in Ancient India*. U.N. Roy, V.D. Misra and J.N. Pandey (eds.): 128-138. Allahabad: University of Allahabad.

Possehl, G.L. and P.C. Rissman 1992. The Chronology of Prehistoric India: From Earliest Times to Iron Age. In *Chronology in the Old World Archaeology, Vol. I*. R.W. Ehrich (ed.): 465-490. Chicago and London: The University of Chicago Press.

Roy, S.R. 1989. Chirand. In *Encyclopedia of Indian Archaeology*, Vol. II. A. Ghosh (ed.): 103-105. New Delhi: Munshiram Manoharlal.

Sharma, G.R. and D. Mandal 1980. Excavations at Mahagara. In *Beginnings of Agriculture*. G.R. Sharma, V.D. Misra, D. Mandal, B.B. Misra and J.N. Pal (eds.): 133-200. Allahabad: Abinash Prakashan.

Singh, B.P. 1990. Early Farming Communities of Kaimur Foot Hills. *Puratattva* 19: 6-18.

Singh, B.P. 1997. Neolithic and Chalcolithic Pottery of Middle Ganga Plain: A Case Study of Senuwar. *Ancient Ceramics (Historical Enquiries and Scientific Approaches)*. P.C. Pant and Vidula Jayaswal (eds.): 3-33. New Delhi: Agam Kala Prakashan.

Singh, B.P. (ed.) 2004. *Early Farming Communities of the Kaimur (Excavations at Senuwar)*, Vol. I & II. Jaipur: Publication Scheme.

Singh, P. 1991. *The Neolithic Origins*. New Delhi: Agam Kala Prakashan.

Singh, P. 1992-93. Archaeological Excavations at Imlidih Khurd - 1992. *Pragdhara* 3: 21-35.

Singh, P. 1993-94. Further Excavations at Imlidih Khurd - 1993. *Pragdhara* 4: 41-48.

Singh, P. and A.K. Singh 1995-96. Trial Excavations at Waina, District Ballia (U.P.). *Pragdhara* 6: 41-61.

Singh, P. and A.K. Singh 1997-98. Trial Excavations at Bhunadih, District Ballia (U.P.). *Pragdhara* 8: 11-29.

Singh, P., A.K. Singh and Indrajeet Singh 1992. Excavations at Imlidih-Khurd. *Puratattva* 22: 120-22.

Singh, R.L. (ed.) 1971. *India: A Regional Geography*. Varanasi: National Geographical Society of India.

Sinha, H.P. 1994. *Archaeological and Cultural History of Bihar (with special reference to Neolithic Chirand)*. New Delhi: Ramanand Vidya Bhawan.

Srivastava, V.C. 1982. *The Prehistoric Afghanistan: A Source Book*. Allahabad: Indological Publications.

Tewari, Rakesh, R.K. Srivastava and K.K. Singh 2002. Excavations at Lahuradeva, Sant Kabir Nagar. *Puratattva* 32: 54-62.

Tewari, Rakesh, R.K. Srivastava, K.K. Singh, K.S. Saraswat and I.B. Singh 2002-2003. Preliminary Report of the Excavations at Lahuradeva, District Sant Kabir Nagar, U.P. 2001-2002: Wider Archaeological Implications. *Pragdhara* 13: 37-68.

Tewari, Rakesh, R.K. Srivastava, K.K. Singh, Ram Vinay, Rajiv Kumar Trivedi and G.C. Singh 2004-2005. Recently Excavated Sites in the Ganga Plain and North Vindhyas: Some Observations Regarding the Pre-urban Context. *Pragdhara* 15: 40-43.

Thapar, B.K. 1965. Neolithic Problem in India. *In Indian Prehistory: 1964.* V.N. Misra and M.S. Mate (eds.): 87-112. Poona: Deccan College Post-Graduate and Research Institute.

Thapar, B.K. 1984. *Fresh Light on the Neolithic Cultures of India. Puratattva* 13-14: 37-43.

Tripathi, Krishnanand 2003. A Note on the Archaeological Remains Collected from Lahuradewa Mound. *Pragdhara* 13: 69-72.

Varma, A.K. 1998. *Neolithic Culture of Eastern India*. New Delhi: Ramanand Vidya Bhawan.

Verma, B.S. 1971. Excavations at Chirand: New Light on Indian Neolithic Complex. *Puratattva* 4: 19-24.

Wheeler, R.E.M. 1948. Brahmagiri and Chandravalli 1947: Megalithic and Other Cultures in Chitaldurga District, Mysore State. *Ancient India* 4: 180-310.

J.N. Pal

Early Farming Culture of the Middle Ganga Plain: Origin, Evolution, Chronology and Main Features

Introduction

The Ganga Plain has a significant position in the great Indo-Gangetic plain, which has played a major role in the origin and development of the history and archaeology of India. Entire Ganga plain geographically also has been an important feature in Indian sub-continent. It looks a flat alluvial land, marked by rivers originating from the Himalayas, horse-shoe-lakes and rivulets emerging from these lakes and also rivers originating in the Vindhyan plateau in the south. It has a slope from north-west to south-east. It is divisible into three main units: (i) upper Ganga plain, (ii) middle Ganga plain, and (iii) lower Ganga plain. The geologists and geographers engaged in the study of the Ganga plain in recent years now have divided, on the basis of some distinctive geomorphic features, slightly differently (Singh 2004-2005). From north to south it has been divided into: (i) Piedmont plain (sloping area close to Himalayas consisting of *Bhabhar* belt and *Tarai* belt), (ii) central alluvial plain (it is the major part of the Ganga plain between the Piedmont plain and the Yamuna Ganga rivers in the south) and (iii) Marginal alluvial plain (north sloping area between Yamuna Ganga rivers and Peninsular craton) and from west to east as (i) Western Ganga Plain (from Delhi-Aravalli ridge to Kanpur), (ii) Median Ganga plain (between Kanpur to Patna) and (iii) Eastern Ganga plain (between Patna and Bengal plain or Ganga delta region). However, in the archaeological literature the region between Allahabad and Bihar-Bengal border has been termed as the middle Ganga Plain (valley).

The middle Gangetic Plain measuring about 144, 409 sq km, is bounded by the Himalayan *tarai* in the north, Vindhyan plateau in the south, Ganga-Yamuna confluence in the west and Bihar-Bengal border in the east. It includes modern eastern Uttar Pradesh and plain of Bihar. On the basis of the river system, the middle Ganga plain is sub-divided into the Ganga Plain North and Ganga Plain South, the former further sub-divisible into (i) the Ganga-Ghaghara doab, (ii) the Ghaghara-Gandak interfluve, (iii) Gandak-Kosi interfluve, and (iv) Kosi-Mahananda interfluve and the latter, i.e., the Ganga Plain South into: (i) West of Karmanasa, (ii) Karmanasa east interfluve, (iii) lower Son valley, and finally (iv) the Magadha-Anga plain (Singh 1971: 190-92). The Ganga, which is the lifeline of the area under discussion, has been the cradle of Indian civilization right from the terminal Pleistocene period. Geologists believe that the Ganga plain, a peripheral foreland basin came into existence in early Miocene, expanded in the middle Miocene and attained its present form in the Late Quaternary. It has a surface cover of Holocene sediments of variable thickness throughout (Singh 1996a, 1996b, 2004, 2004-2005, 2005). The Ganga plain was initially very rich in wild flora and fauna due to favourable climate, but has now to some extent been changed because of deforestation and excessive hunting and cutting of forest primarily due to pressure of human population.

Significance of the Mid Ganga Plain

The middle Ganga plain has been a cradle of Indian culture from hoary past. It was a meeting point of different cultures of north, south, east and west. The area, as per *Upanishads*, has privilege of hearing philosophical discussion of thinkers of ancient period as *Yagyavalkya* and others. The land is associated traditionally with the activities of Ram of *Ramayana*. Similarly deductive portions of *Mahabharata* are supposed to have got their final shape in this region. It was also a nerve centre of the political, economic and religious upheavals of 6th century BC and witnessed the second urbanization of the sub-continent.

The middle Ganga plain also may be credited with one of the early centres of origin of agriculture and domestication, which paved the way for development of Chalcolithic cultures and civilization in the early Iron Age in the area. The traditional view (Childe 1951) is still popularly held that the adoption of agriculture resulted in the improvement of human health, improvement in the quality and reliability of human food supply and the overall lessening of labour demand in the food quest. The scholars engaged in the study of modern tribes (Binford 1968, Cohen 1977, Flannery 1969, Meyrs 1971) argue that agriculture should be viewed as an economic strategy necessitated by high population density among hunter-gatherers and/or by declining wild resources (Cohen 1984). Though agriculture and domestication facilitated life of man but it also brought several problems with it. Adoption of intensified utilization and processing of vegetable food sources by Neolithic and later populations permitted increasing population density but led to lower quality nutrition and an increase in certain pathologies (Kennedy 1984).

Climate During the Holocene Period

The natural vegetation in the area has not changed much during the last ten millennia except due to pressure of population and industrialization in the later part of the last century; there was delimitation in vegetation cover. If we accept that the change in climate was not a local phenomenon and see the evidence of Rajasthan, as suggested by G. Singh and his associates, the beginning of Holocene was moist for about 500 years and again another moist phase was between 3000 BC and 200 BC (Mehr-Homji 1980). The archaeologists generally believe that the climatic amelioration along with technological advancement during the early Holocene resulted in the population increase in early Holocene period (Misra 1989). The climate was becoming adverse when the moist phase was over and man was forced to produce food by farming and domestication.

Emergence of Human Cultures in the Middle Ganga Plain

The changing climatic conditions during early and middle phases of Holocene in the area played a significant role in the evolution of early farming cultures. The excavations and explorations conducted during the last four decades by University of Allahabad, Banaras Hindu University, Deen Dayal Upadhyaya University Gorakhpur, University of Patna, U.P. State Archaeology Department, Bihar State Archaeology Department and Patna Circle of the Archaeological Survey of India, have furnished a complete cultural sequence of the region – Epipalaeolithic, Mesolithic, Neolithic, Chalcolithic, Early Iron Age and historical periods (Fig. 1). The Gangetic plain was far the first time colonized by the Stone Age culture of the Vindhyas. Right from the earliest phase, *i.e.*, Epipalaeolithic and Mesolithic, both the regions, Vindhyas and the Ganga plain, have been in close cultural contacts. Recent excavations have thrown new light on the early farming culture of the area. Present paper proposes to shed light on the origin, evolution and life of the first farming culture (Neolithic) of the Gangetic plain.

The hunter gatherers of Epipalaeolithic and Mesolithic period were living close to small rivers and horse-shoe lakes and must be using large amount of plant food as it was easily available in plenty. In the Sanai Tal sequence the evidence of anthropogenic pollens and micro charcoal indicating some kind of intervention in vegetation by the humans since 15 yr BP has been obtained (Sharma *et al*. 2001). The change of hunter gatherer economy to agriculture was a result of series of developments in the human behaviour, climate change and vegetation change over a long period of time (Singh 2004-2005: 23). Early to mid Holocene climatic optimum (10,000-5800 ^{14}C yr BP) is characterized by a lake environment indicating a sensitive response of the lake ecology to the climatic warming and increased rainfall. Then comes an arid event during 5000-2000 ^{14}C yr BP and from 1700 ^{14}C yr BP there is evidence of climatic amelioration (Sharma *et al*. 2004).

A great deal of emphasis is now being given to the archaeology of the Gangetic plain especially the middle Gangetic plain and a good number of archaeologists are taking interest in

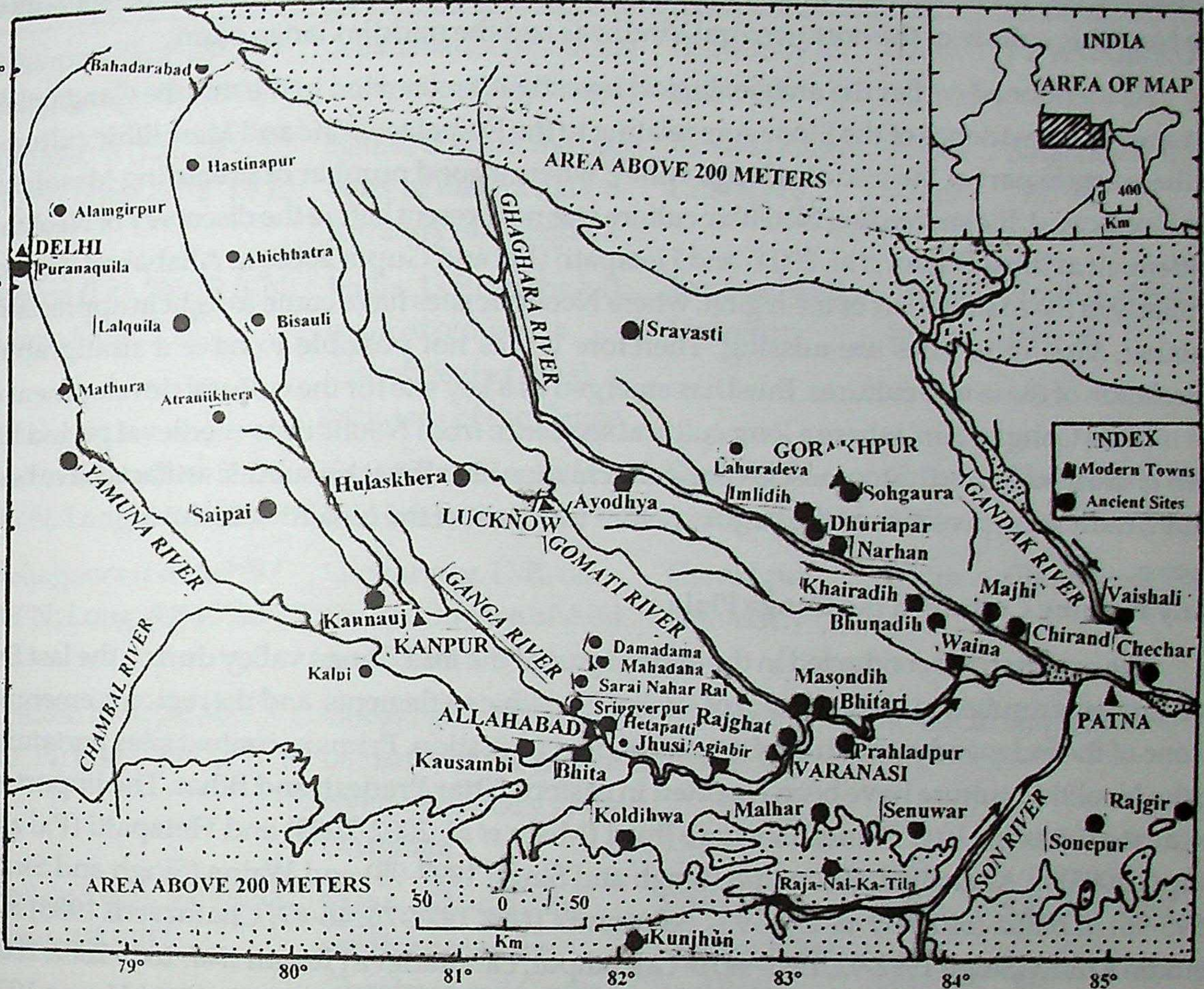

INDIA
AREA OF MAP
AREA ABOVE 200 METERS
GHAGHARA RIVER
YAMUNA RIVER
GANGA RIVER
GOMATI RIVER
GANDAK RIVER
SON RIVER
CHAMBAL RIVER
DELHI
LUCKNOW
KANPUR
ALLAHABAD
VARANASI
GORAKHPUR
PATNA
Bahadarabad
Hastinapur
Alamgirpur
Puranaquila
Ahichhatra
Lalquila
Bisauli
Mathura
Atranjikhera
Saipai
Hulaskhera
Ayodhya
Sravasti
Kannauj
Kalpi
Damadama
Mahadaha
Sarai Nahar Rai
Sringverpur
Hetapatti
Jhusi
Agiabir
Kausambi
Bhita
Koldihwa
Malhar
Senuwar
Raja-Nal-Ka-Tila
Kunjhun
Lahuradeva
Imlidih
Sohgaura
Dhuriapar
Narhan
Khairadih
Bhunadih
Waina
Masondih
Bhitari
Rajghat
Prahladpur
Majhi
Chirand
Vaishali
Chechar
Rajgir
Sonepur
INDEX
Modern Towns
Ancient Sites
50 0 50
Km
28°
27°
26°
25°
79°
80°
81°
82°
83°
84°
85°

Fig. 1. Main archaeological sites in the Ganga plain and neighbouring Vindhyas

different aspects of archaeological cultures of the Ganga plain. The studies of the bio-archaeology of the Mesolithic culture of the middle Gangetic plain have been conducted in much detail and national and international seminars/colloquium have been conducted in view of their importance (Misra and Pal 2002; Afanas'ev *et al.* 1996). The study of the Neolithic culture of the Gangetic plain is also getting its due importance in archaeological literature of India.

The scholars who made concerted efforts to group the Neolithic culture of India in geographical units have put the Neolithic culture of this region in a separate geographic unit (P. Singh 2002; B.K. Thapar 1984; Agrawal and Kharakwal 2002; Allchin and Allchin 1968, 1982, 1997; J.N. Pal 1977; Chakrabarti 2006). By the time V.D. Krishnaswami (1965) and B.K. Thapar (1965), who were first to put the Neolithic cultures of India in geographical zones, were compiling the data on Neolithic culture of India, there was no evidence of the culture in this zone. Hence there is not mention of Neolithic culture of the Ganga valley, because by that time no site of this culture was on the scene. However, the present available evidence gives a distinct personality to the Neolithic culture of the north-central Vindhyas and the middle Ganga plain.

As mentioned earlier the archaeological investigations carried in the middle Ganga plain have revealed evidence of the Stone Age relating to the Epipalaeolithic and Mesolithic cultures. In the western part of the middle Ganga valley, where a good number of preceding Mesolithic sites are located, the succeeding Neolithic culture was not present before the discovery of Neolithic settlement at Jhusi (Misra *et al*. 2004) and Hetapatti (Pal and Gupta 2005) in Allahabad district; similarly in the eastern part of the region, where Neolithic sites have come to light in appreciable number, Mesolithic sites are missing. Therefore it was not possible to have a stratigraphic correlation of these two cultures. Jhusi has emerged as a key site for the cultural development of the middle Ganga plain, where a long cultural sequence from Neolithic to medieval period has been unearthed. From the topmost geological formation near Jhusi Mesolithic artifacts have been found, indicating presence of the culture before the onset of the Neolithic culture.

Early Farming Culture in the Ganga Plain

The explorations conducted in the eastern part of the mid Ganga valley during the last five decades have resulted in identification of several Neolithic settlements, and the region is emerging as one of the independent centres of origins of rice cultivation. Primary context sites pertaining to the Neolithic culture have been reported in eastern Uttar Pradesh and Bihar. The important excavated sites in Uttar Pradesh include Jhusi (Misra *et al.* 2002-2003) and Hetapatti (Pal and Gupta 2005) in Allahabad, Bhunadih (Singh and Singh 1997-98) and Waina (Singh and Singh 1995-96) in Ballia (Singh *et al.* 1994-95), Sohagaura (*IAR 1974-75*: 46-47, Chaturvedi 1985) and Imlidih Khurd (Singh 1992-93, 1993-94) in Gorakhpur, Lahuradeva (Tewari *et al.* 2001-2002, 2002-2003, 2004-2005) in Sant Kabir Nagar district, while Chirand (*IAR 1981-82*: 13-14, Verma 1971, Narain 1970, Varma 1998, Sinha 1994, Roy 1989) in Saran, Chechar Kutubpur (*IAR 1977-78*: 17-18) in Vaishali, Taradih (*IAR 1984-85*: 9-10, *IAR 1986-87*: 23-24, *IAR 1987-88*: 9-11) in Gaya, Maner (*IAR 1985-86*: 11-12, *1986-87*: 25-26, *IAR 1987-88*: 11-12, *IAR 1988-89*: 7-8) in Patna and Senuwar (Singh 1990, 1997, 2001, 2004) in Rohtas district in Bihar. Most of these excavated sites are multi-culture sites having yielded archaeological relics ranging from Neolithic to early historical periods (Misra 2007).

Neolithic Sites in the Middle Ganga Plain

Name of the Site	*Location*	*Excavated by*	*Thickness*	*Reference*
Jhusi (Lat. 25^{0} 26′ 10″N; Long. 81^{0} 54′ 30″E)	Allahabad, U.P., on the confluence of the Ganga and Yamuna	University of Allahabad	1.5 m	Misra *et al.* 2002-03

contd.

Name of the Site	*Location*	*Excavated by*	*Thickness*	*Reference*
Hetapatti (Lat. 25^{0} 29′ 0″ N; Long. 81^{0} 55′ 31″E)	Allahabad, U.P., on the left bank of the Ganga	University of Allahabad	60 cm	Pal and Gupta 2005
Bhunadih (Lat. 25^{0} 19′ 10″N; Long. 84^{0} 5′ 11″E)	Ballia, U.P., on the right bank of Bahera nala, a tributary of Ghaghara	Banaras Hindu University	About 50 cm	Singh and Singh 1997-98
Waina (Lat. 25^{0} 45′ 5″N; Long. 84^{0} 0′ 5″E)	Ballia, U.P., on the left bank of old bed of Chhoti Sarju (Tons), a tributary of the Ganga	Banaras Hindu University	About 40 cm	Singh and Singh 1995-96
Lahuradeva (Lat. 26^{0} 46′N; Long. 82^{0} 57′E)	Sant Kabir Nagar, U.P., on a horseshoe lake	State Archa--eology, U.P.	45 cm	Tewari *et al.* 2002-2003
Sohagaura (Lat. 26^{0} 30′ 30″N; Long. 83^{0} 15′ 25″E)	Gorakhpur, U.P., on the confluence of Ami and Rapti	Gorakhpur University	60 cm	Chaturvedi 1985
Imlidih (Lat. 26^{0} 30′ 30″ N; Long. 83^{0} 12′ 5″ E)	Gorakhpur, U.P., on the left bank of the Kuwana river, a tributary of the Ghaghara	Banaras Hindu University	50-60 cm	Singh 1992-93
Chirand (Lat. 25^{0} 45′N; Long. 84^{0} 50′E)	Saran, Bihar, on the confluence of the Ghaghara and Ganga	State Archa--eology, Bihar and Patna University	3.5 m	S.R. Roy 1989
Chechar-Kutubpur (Lat. 25^{0} 30′ 10″N; Long. 85^{0} 30′ 45″E)	Vaishali, Bihar, on the left bank of the Ganga	ASI, Patna Circle		*IAR 1977-78*: 17-18
Taradih (Lat. 24^{0} 42′N; Long. 85^{0} 0′E)	Gaya, Bihar, South-west of Mahabodhi temple	State Archa--eology, Bihar	70 cm	*IAR 1984-85*: 9-10, *IAR 1986-87*: 23-24, *IAR 1987-88*: 9-11
Maner (Lat. 25^{0} 30′ 45″N; Long. 84^{0} 45′ 25″E)	Patna, Bihar, on the bank of the Ganga	Patna University	3.45	*IAR 1985-86*: 11-12, *1986-87*: 25-26, *IAR 1987-88*: 11-12, *IAR 1988-89*: 7-8
Senuwar (Lat. 24^{0} 56 N′; Long. 83^{0} 56′E)	Rohtas, Bihar, Right bank of Kudra river	Banaras Hindu University	1.50 m	*IAR 1986-87*: 26-28

Excavations conducted at Chirand, Senuwar, Imlidih Khurd, Lahuradeva and Jhusi have thrown welcome light on the corpus of cereals having been cultivated by the Neolithic people of the mid Ganga plain (Pal 2008, Gupta *et al*. 2008, Pokharia and Pal nd).

Settlement Pattern

All the excavated sites are located on the banks of rivers, generally on the confluence of two rivers, near meander above the flood plain or on horse-shoe lakes as in the case of Lahuradeva. The archaeological deposits are resting on the geological formations. The geological formations at Jhusi and Hetapatti just below the archaeological occupation deposits measure 15 and 10 m respectively. Easy availability of water, cultivable land and also easy availability of food in the form of suitable vegetation, animals and aquatic creatures was the prime consideration for selecting a site for settlement.

Structures

The Neolithic horizon at most of the sites lying below a thick deposit of later period could not be excavated on a large scale. However, the limited scale excavations have brought to light evidence of circular or oval huts from almost all excavated sites of the area. Wattle and daub structure is attested by good number of burnt clay lumps with bamboo and reed impression. The hut floors encircled by postholes are marked by potsherds, food processing equipments, microliths, bone tools and other artifacts of daily use (Illus. 1). At Chirand, the evidence of pit dwelling has also been reported. Of the other structural remains mention may be made of hearths, pits and silo probably for storing the grains. A well plastered burnt floor enclosed by two parallel walls was possibly used for cooking food and firing the pottery (Illus. 2).

Subsistence

The Neolithic people of the Ganga valley as those of the Vindhyas were farming and pastoral communities is attested by the cultivated variety of rice, barley, wheat, field pea, lentil, green gram, etc. recovered from the excavated sites. However, the botanical evidence obtained from Senuwar and Jhusi in mid Ganga valley read with its counter part of Tokwa in the Vindhyas suggests that in the early phase only rice and some primitive millets were being cultivated (Misra 2007, Harvey *et al*. 2005). With the passage of time other cereals were also added. The Neolithic deposit at Senuwar (Singh 2001: 109-118) is divided into two subgroups IA and IB. From the lowest part of the middle of period IA only grains of cultivated rice (*Oryza sativa*), were found along with wild plants like jobs tear, fox tail/bandra, wild rice, *jharberi*, *chaulai* and wild *palaka*. But in the later phase of IA new cereals like barley, wheat, *jowar* millet, lentil, field pea, finger millet (*ragi*) and *khesari* were introduced (Saraswat 2003). The available evidence shows that by the late phase of Neolithic culture in the mid Ganga valley, double crop pattern had become a regular feature. However, it may be mentioned that cereals of the winter and rainy crops including rice (*Oryza sativa*), six-rowed hulled barley (*Hordeum vulgare*), bread wheat (*Triticum aestivum*), dwarf wheat (*Triticum sphaerococcum*), lentil (*Lens culinaris*), field pea (*Pisum arvense*), grass pea (*Lathyrus sativus*), horse gram (*Macrotyloma uniflorum*), green gram (*Vigna radiata*), sesame (*Sesamum indicum*), linseed (*Linum usitatssimum*), etc. have been reported from the early levels of Jhusi (Pokharia and Pal nd).

Domesticated animals include cattle (*Bos indicus*), buffalo (*Bubalus bubalis*), sheep, goat and pigs. Domesticated pig has been found from Senuwar. Domesticated mammals that were not included food are dog and cat. Besides these, the bones of elephants, rhinoceros, stag, deer, etc. have also been found from some of the sites. Of aquatic fauna whose bones have been found, mention may be made of fish and turtle. Bones of birds have also been found. The meat was part of their diet is attested by charred bone fragments and bones with sharp cut mark (Joglekar *et al.* 2008). The available evidence, thus, indicates that besides agriculture and domestication the Neolithic people of the mid Ganga plain also practiced hunting, catching and fishing.

Material Culture

The Neolithic culture of the Gangetic plain is marked by a rich and varied ceramic industry. The available evidence indicates that in the early stage of the culture, as indicated at Chirand, Lahuradeva, Jhusi and Hetapatti, people were using hand made pottery but subsequently the slow wheel appears to have been used for the purpose. The ceramic assemblage includes ordinary red ware, lustrous red ware, burnished ware (red, black and grey), rusticated ware, crude black-and-red ware and cord impressed ware. The clay used for manufacturing the pots is not well levigated. It contains grits, husks and chaff as degraissant. Pots are generally ill fired and have blackish grey core. Pottery types including bowls with varying profile, vases, vessels, basins, miniature jars, *handis*, etc. suggest that these were used for storing, cooking and also kitchen wares. A large number of vases with rustication and soot mark on outer surface indicate that these were for cooking, possibly for boiling rice. Bowls basins and vases also have some times spouts, suggesting consumption of liquid or semi-liquid food. The cord-impressed pottery is a distinguishing feature. Some times rustication or burnishing is done on the cord impressed surface. A variety of pattern in cording has been found at Jhusi (Illus. 3) and Hetapatti. Some of the pots, generally vases, were made in two parts separately - the body and the rim portion and subsequently these were luted together. Spouts were also luted to the bowls or basins after making them separately. Painted sherds have been reported from Imlidih Khurd, Lahuradeva, Chirand and Senuwar. The post firing paintings in red ochre confined to the rim of pots were found at Chirand and Senuwar. The painting motifs consist of linear designs of criss-cross lines and concentric circles. At Imlidih Khurd painting executed in white red pigment over a bright slip has been reported. Post firing scratch designs, consisting of generally geometric patterns like opposed triangles within concentric circles and floral motifs is another feature of decorating the pots. Scratching is done by sharp instrument. Appliqué decorations especially on the shoulder of basins or *handis* also have been found at many sites. On these appliqué are executed chain and rope patterns or incised decorations. Wheel-thrown pots are also reported from the late Neolithic phase of some of the sites like Senuwar.

The rice cultivation and cord impressed pottery are interlinked to each other, having greater antiquity in the Neolithic in a wide area. The cord impressed ware associated with the Neolithic culture (rice cultivation) has been found in south eastern coastal China, in the Yangtze valley, southern China, Japan, Indo-China, Gangetic plain, Vindhyas, eastern and north-eastern India and in the Himalayas. It has been suggested that the central position of rice in cultures through out southern and eastern Asia has great antiquity, reflecting both the nutritional value of rice and its long history of cultivation and on the basis of cord impressed ware, early dates for rice cultivation in different regions, linguistic data and similarity of agricultural rites, rituals and festivals and deep respect for rice all point out remote antiquity in India and strong inter-links among China, Japan and India (Kharakwal *et al*. 2004). There are large number of rituals and festivals associated with rice in these early rice growing regions and several among them are common or analogous (Kharakwal and Yano 2007).

As revealed from the excavated sites the culture is associated with microlithic industry. Microlithic element is comparatively more prolific at the sites which are nearer to the Vindhyas. Bladelets, flakes, blades, scrapers, arrowheads, serrated points, lunates, borers, etc. fashioned on chert, chalcedony, agate, jasper, and quartz have been found from some of the sites like Chirand, Maner, Jhusi, etc. However, celts of basalt and granite have been obtained from Lahuradeva, Chirand and Senuwar. Heavy-duty stone objects include fragments of querns, mullers, balls, hammer stones, etc. fashioned on sandstone or quartzite. Spindle whorls also have been found from many sites. Beads, finished and unfinished and fashioned on chalcedony, agate, etc. have been found at Jhusi, Chirand and Senuwar. Chirand, Lahuradeva, Jhusi and Hetapatti have also yielded micro-beads of steatite and/or faience. Micro-beads in the form of barley grain have been recovered from Jhusi.

Bone tools have been found at Jhusi (Illus. 4), Senuwar and Chirand. The last site has yielded a corpus of bone tools and weapons including celts, scrapers, chisels, hammers, needles, points, borers, awls, arrowheads, etc. Other bone objects comprise ornaments like pendants, earrings, bangles, discs, combs, etc.

Terracotta objects including edge ground potsherds (triangular or rectangular in shape), spherical beads with central perforation were obtained from Senuwar. Chirand has yielded terracotta wheels, beads, bangles, cakes, birds, snakes, etc.

Origin

The archaeological evidence indicating prelude to agriculture during the Mesolithic period is not so clear as it is in the Vindhyas. The hutments, food processing equipments, wild animals and wild grains (rice), microlithic tools, bone and ceramic industries it can be concluded that the base for the Neolithic culture was being prepared in the Vindhyas during Mesolithic period. Radiocarbon dates from the Mesolithic sites of the Vindhyas and the Ganga plain are Baghor II: 6380±220 BC; Paisara: 7420±110 BC; Lekhahia RS I: 6420±75 BC (AMS), 6050±75 BC (AMS); Sarai Nahar Rai: 8395±110 BC; Damdama: 6690±65 BC (AMS), 6915±65 BC (AMS), which confirm that Mesolithic culture was on the scene before the advent of the Neolithic culture, but there is no evidence of stratigraphic contact between the two cultures.

The first farming and pastoral culture of the Vindhyas is the Neolithic culture. As revealed from the Mesolithic culture of the area, hutments, food processing equipments, microliths, bone tools, ceramic industries and wild animals and wild grains, which were domesticated/cultivated and utilized subsequently in the Neolithic period, it can be inferred that the base for the Neolithic culture was being prepared in the Mesolithic period (Misra 2002).

Neolithic culture of the Vindhyas is also credited with developing the Neolithic culture in the Gangetic plain as indicated by comparative study of the culture of both the regions. The excavated sites of the Vindhyas and Ganga plain present ample evidence of cultural contact of both the regions. The preceding Mesolithic culture of the Ganga valley contains food-processing equipments made on sand stone/quartzite but no pottery, whereas in the Vindhyas it is associated with hutments and hand made pottery also. Among the ceramic industries, the cord-impressed ware has much archaeological importance as it denotes the cultural contact of Vindhyas with that of the Ganga plain. The cord-impressed ware has been found in Neolithic context at Chirand, Chechar Kutubpur, Taradih, Sohagaura, Lahuradeva, Jhusi and Hetapatti in the middle Gangetic plain that has techno-typological similarity with that of the Vindhyas. The evidence suggests that the Neolithic pottery of the middle Gangetic plain has a considerable influence of the Vindhyan Neolithic pottery. It is suggested that the Neolithic culture of the Ganga plain owes to the Vindhyan Neolithic for its origin.

Chronology

The problem of the antiquity of the Neolithic culture of the region is still not finally settled but now we have some relevant ^{14}C dates from the excavated Neolithic sites of the Vindhyas and Ganga plain. Considering three of C-14 dates reading 4530 ± 185 BC (PRL 101), 5440 ± 240 BC (PRL 100) and 6570 ± 210 BC (PRL 224) obtained from Koldihwa as dependable, the culture was dated to the 7th-6th millennium BC (Sharma *et al*. 1980). But being the only site of such antiquity doubts were raised by several scholars. The ^{14}C date belonging to the transitional phase of the Neolithic to Chalcolithic at Koldihwa is 1440 ± 120 BC (PRL 223). The absolute dates obtained from Mahagara also indicated a late date to the culture, though these dates have the possibility of contamination of samples. Two TL dates reading 2265 BC and 1616 BC and four ^{14}C dates reading 1440 ± 150 BC (PRL 409), 1330 ± 120 BC (PRL 408), 1440 ± 100 BC (PRL 407) and 1480 ± 110 BC (BSIP) have been obtained from the samples from Mahagara. These dates are not consistent with the stratigraphy possibly due to contamination of samples. In the light of calibrated ^{14}C date obtained from Kunjhun, reading 3530-3335, the beginning of the Vindhyan Neolithic culture was proposed to 4th millennium BC (Clark and Khanna 1989). Three ^{14}C dates have come to light from recent excavations at Lahuradeva in the middle Gangetic plain, which read as 5320 ± 90 BP (BS 1951) (cal BC 4220, 4196, 4161) and 6290 ± 160 BP (BS 1966) (cal BC 5298) (Tewari *et al.* 2001-2002, 2002-2003). Recently three relevant ^{14}C dates have been obtained from Tokwa. When calibrated these read 6591 BC (BS - 2417), 5976 BC (BS - 2369), 4797 BC (BS - 2464). An AMS ^{14}C date for a carbonized domesticated rice would push the antiquity of the Neolithic culture at Lahuradeva in 7th millennium BC (Tewari *et al.* 2004-2005: 40). From the Neolithic horizon of Jhusi three ^{14}C dates have been obtained. These dates when calibrated, read 7477 BC (BS - 2526), 5837 BC (BS - 2524) and 6196 BC (BS - 2525). The earliest date obtained from the site would put the beginning of the Neolithic culture of the site in 8th millennium BC.

Regarding the span of the Neolithic culture, observations of P. Singh are very significant, 'domestication was a process which took considerable time and domestication of each type of domesticable animal and plant species would have taken place in different ecological niches at different times' (Singh 1991: 5, Singh 2002: 128). In the Ganga plain Neolithic culture and Neolithic way of life lasted for a long time starting from 8th-7th millennium BC to 3rd-2nd millennium BC.

Early ^{14}C Dates from Neolithic Sites

Site	*^{14}C date*	*Remark*
Koldihwa	4530±185 BC = 5410 - 5010 BC, 5440±240 BC = 6395 - 5645 BC	On the Belan in the Vindhyas
Tokwa	4797 BC, 5976 BC, 6407 BC	On the confluence of the Belan and Adwa in the Vindhyas
Kunjhun	1565 BC, 2675 BC, 3530 BC	On the right bank of the Son in the Vindhyas
Lahuradeva	4220 BC, 5298 BC, An AMS date mid 7th millennium BC	On the bank of a horse-shoe lake in the mid Ganga Plain
Jhusi	7110 BC, 5649 BC, 5938 BC, later half of 8th millennium BC	On the confluence of the Ganga and Yamuna

The combined testimony of the available ^{14}C dates obtained from Koldihwa, and Tokwa in the Vindhyas and Jhusi and Lahuradeva in the middle Ganga plain would push the antiquity of the Neolithic culture in the northern Vindhyas and the middle Ganga plain to a hoary past. The antiquity of the early farming culture of the Gangetic plain on the basis of these dates may be pushed back to the later half of 8th millennium BC and almost same or slightly earlier antiquity may be proposed for the Neolithic culture of the Vindhyas.

Discussion

The discovery as a result of excavations at the Mesolithic sites of Sarai Nahar Rai, Mahadaha and Damdama in the Gangetic plain by the Department of Ancient History, Culture and Archaeology, University of Allahabad in the sixth, seventh and eighth decade of the last century presented a surprise because Stone Age culture sites of the Mesolithic phase were located in an area totally free of hills - the source of stone supply. Indications of the Mesolithic culture were available from more than 200 sites in the mid-Ganga plain (Sharma *et al.* 1980) but Neolithic was conspicuous by its absence in this area. It was, therefore, surmised that there was a cultural break after the Mesolithic in this region and settlers of the Chalcolithic phase at Jhusi and other sites probably were not native to this region. But the current excavations at Jhusi have succeeded in discovering below the Chalcolithic phase nearly 1.5 m thick Neolithic deposit. This excavation is significant because it presents the proof of cultural continuity in an unbroken sequence right from the Mesolithic through the Neolithic to the Chalcolithic which again continued in an unbroken sequence into the historical period downs to the time of the Buddha and, further on, up to the early medieval period. In this way, it is an epoch-making discovery, as it has taken the antiquity of the region in an unbroken manner to the Mesolithic times.

The archaeological evidence shows that the Gangetic plain owed to the Vindhyas not only for its first colonization in the Mesolithic period but as evident by very close affinity in the ceramic industries, microlithic component, food processing equipments, bone tools, beads and settlement pattern revealed from the excavations at Tokwa and other sites in the Vindhyas and Jhusi and other sites in the middle Gangetic plain it can be concluded that both the regions are intimately related to each other for the origin and development of Neolithic culture. The ^{14}C dates from recent excavations at Jhusi and Lahuradeva in the middle Ganga plain and Tokwa in the Vindhyas suggest that this region was one of the early centers of agriculture in the world. The evidence of barley (*Hardeum vulgare*), bread wheat (*Triticum aestivum*) and other winter crops along with summer crop like rice (*Oryza sativa*), etc. from early levels of Neolithic Jhusi (Pokharia and Pal nd) indicates that the area was in cultural contact with the original home of winter crops right from the early phase of the Neolithic culture. It may be mentioned that in still nearer region the Himalayan *tarai* still has some wild barley species. The wild ancestor of the six rowed barley (Hardeum hexastichum) is found in eastern Tibet (Randhawa 1980: 104). We can not altogether deny that the Ganga plain was not suitable area for the growth of barley and wheat in wild form. There is still possibility that the barley and wheat were present in the area in wild form and were included in the agriculture indigenously.

Conclusion

Recent excavations of the early farming culture sites in the Gangetic plain have revealed interesting evidence of a center of early origin of agriculture in India. The excavations at Lahuradeva in Sant Kabir Nagar district and at Jhusi in Allahabad district have revealed a Neolithic culture characterized by mostly handmade ceramic industry, bone tools, beads of semi-precious stone, micro disc-beads of steatite, circular hut floors, cultivated and wild cereals and domesticated and wild animal bones. The comparative study of the culture with that of the Vindhyas indicates that its origin lies in the Vindhyan Neolithic culture. The early chronology indicates that it was one of the early centres of origin of agriculture.

Acknowledgement

We are thankful to Dr. K.S. Saraswat and Dr. A.K. Pokharia for the ^{14}C dates and also for the study of botanical remains from Neolithic Jhusi.

BIBLIOGRAPHY

Afanas'ev, Gennadii E., Serge Cleuziou, John R. Lukacs, Maurizio Tosi (eds.) 1996. *Bioarchaeology of Mesolithic India: An Integrated Approach*, Colloquium XXXIII, *The Prehistory of Asia and Ocenia*, International Union of Prehistoric and Protohistoric Sciences, Forli: ABACO Edizioni.

Agrawal, D.P. and J.S. Kharakwal 2002. *South Asian Prehistory: A Multidisciplinary Study.* New Delhi: Aryan Books International.

Allchin, B. and R. Allchin 1968. *Birth of Indian Civilization.* Harmondsworth: Penguin Books.

Allchin, B. and R. Allchin 1982. *The Rise of Civilization in India and Pakistan.* Cambridge: Cambridge University Press.

Allchin, B. and R. Allchin 1997. *Origins of a Civilization: The Prehistory and Early Archaeology of South Asia.* New Delhi: Viking Penguin India.

Binford, Lewis 1968. Post Pleistocene Adaptations. In *New Perspectives in Archaeology.* L.R. Binford and S.R. Binford (eds.): 313-341. Chicago: Aldine.

Chakrabarti, D.K. 2006. *The Oxford Companion to Indian Archaeology: The Archaeological Foundations of Ancient India.* New Delhi: Oxford University Press.

Chaturvedi, S.N. 1985. Advance of Vindhyan Neolithic and Chalcolithic Cultures to the Himalayan Tarai: Excavation and Explorations in the Sarayupar Region of Uttar Pradesh. *Man and Environment* 9: 101-108.

Childe, V.G. 1951. *Man Makes Himself.* New York: Mentor.

Clark, J. Desmond and Gurucharan S. Khanna 1989. The Site of Kunjhun II, Middle Son Valley and its Relevance for the Neolithic of Central India. In *Old Problems and New Perspectives in the Archaeology of South Asia.* Wisconsin Archaeological Reports, Vol. 2. J.M. Kenoyer (ed.): 29-46. Madison: Department of Anthropology, University of Wisconsin.

Cohen, M.N. 1977. *The Food Crisis in Prehistory.* New Haven: Yale University Press.

Cohen, M.N. 1984. An Introduction to Symposium. In *Palaeopathology at the Origins of Agriculture.* Mark Nathan Cohen and George J. Armelagos (eds.): 1 ff. Orlando, Florida: Academic Press.

Flannery, K.V. 1969. Origins and Ecological Effects of Early Agriculture. In *Domestication and Exploitation of Plants and Animals.* P.J. Ucko and G.W. Dimbleby (eds.): 73-100. London: Duckworth.

Gupta, M.C., J.N. Pal and V.D. Misra 2008. Beginnings of Agriculture in the Middle Ganga Plain with Special Reference to Recent Excavations at Jhusi. In *History of Science, Philosophy and Culture in Indian Civilization* (General ed. D.P. Chattopadhyaya) Vol. V, Part I, *History of Agriculture in India (upto c. 1200 AD).* Lallanji Gopal and V.C. Srivastava (eds.): 87-99, New Delhi: Concept Publishing Company.

Harvey, E.L., D. Fuller, J.N. Pal and M.C. Gupta 2005. Early Agriculture of the Neolithic Vindhyas (North-Central India). *South Asian Archaeology* 2003 Ute Franke Vogt and Hans-Joachim Weisshaar (eds.): 329-334. Aachen, Linden Soft Verlog e.k.

Joglekar, P.P., J.N. Pal, V.D. Misra and M.C. Gupta 2008. Faunal Remains Recovered from the Neolithic Phase at Jhusi, District Allahabad, Uttar Pradesh. *Puratattva* 38: 251-259.

Kennedy, K.A.R. 1984. Growth, Nutrition and Pathology in Changing Palaeodemographic Settings in South Asia. In *Palaeopathology at the Origins of Agriculture.* Mark Nathan Cohen, George J. Armelagos (eds.): 169-192. Orlando, Florida: Academic Press.

Kharakwal, J.S. and A. Yano 2007. Rice Cultivation: Associated Rituals and Festivals with Special Reference to Central Himalayas. In *Traditional Knowledge System and Archaeology with Special Reference to Uttarakhand.* D.P. Agrawal, Manikant Shah Sameer Jamal (eds.): 83-99. New Delhi: Aryan Books International.

Kharakwal, J.S., A. Yano, Y. Yasuda, V.S. Shinde and T. Osanda 2004. Cord Impressed Ware and Rice Cultivation in South Asia, China and Japan: Possibilities of Inter-links. *Quaternary International* 123-125: 105-115.

Krishnaswami, V.D. 1965. Neolithic Pattern in India. *Ancient India* 16: 25-64.

Mehr-Homji, V.M. 1980. The Thar Desert: Its Climatic History. *Man and Environment* 4: 1-7.

Meyrs, J.T. 1971. The Origins of Agriculture: An Evaluation of Hypothesis. In *Prehistoric Agriculture.* S. Streuver (ed.): 101-121. Gardencity: Natural History Press.

Misra, V.D. 2002. Origin, Chronology and Transformation of the Mesolithic Culture in India. In *Mesolithic India*. V.D. Misra and J.N. Pal (eds.): 447-464. Allahabad: Department of Ancient History, Culture and Archaeology, University of Allahabad.

Misra, V.D. 2007. Stone Age Cultures: Their Chronology and Beginnings of Agriculture in the North-Central India. *Man and Environment* 32 (1): 1-14.

Misra, V.D. and J.N. Pal (eds.) 2002. *Mesolithic India*. Allahabad: Department of Ancient History, Culture and Archaeology, University of Allahabad.

Misra, V.D., J.N. Pal and M.C. Gupta 2002-2003. Further Excavations at Jhusi: Evidence of Neolithic Culture. *Pragdhara* 13: 227-229.

Misra, V.D., J.N. Pal and M.C. Gupta 2004. Significance of Recent Excavations at Tokwa in the Vindhya and Jhusi in the Gangetic Plain. *Journal of Interdisciplinary Studies in History and Archaeology* 1 (1): 120-127.

Misra, V.N. 1989. Stone Age India: An Ecological Perspective. *Man and Environment* 14 (1): 17-64.

Narain, L.A. 1970. The Neolithic Settlement at Chirand. *The Journal of Bihar Research Society* 56: 16-35.

Pal, J.N. 1977. *'Bhartiya Nava Pashanik Sanskritiyan'* (Hindi). In *'Bhartiya Pragaitihasik Sanskritiyan'* (Hindi). R.K. Varma (ed.): 272-282. Allahabad: Paramjyoti Prakashan.

Pal, J.N. 2008. Recent Excavations at Tokwa: Fresh Light on the Early Farming Culture of the Vindhyas. *History of Science, Philosophy and Culture in Indian Civilization* (General ed. D.P. Chattopadhyaya) Vol. V, Part I, *History of Agriculture in India (upto c. 1200 AD)*. Lallanji Gopal and V.C. Srivastava (eds.): 48-69, New Delhi: Concept Publishing Company.

Pal, J.N. and M.C. Gupta 2005. Excavations at Hetapatti (Allahabad District): Some Preliminary Observations. *Journal of Interdisciplinary Studies in History and Archaeology* 2 (1) (Summer 2005): 163-168.

Pokharia, A.K. and J.N. Pal nd. On the Record of Plant Macro-remains from Neolithic Jhusi in Ganga Plain: Evidence for Grain-based Agriculture.

Randhawa, M.S. 1980. *A History of Agriculture in India, Volume I: Beginning to 12th Century*. New Delhi: Indian Council of Agricultural Research.

Roy, S.R. 1989. Chirand. In *Encyclopedia of Indian Archaeology*, Vol. II. A. Ghosh (ed.): 103-105. New Delhi: Munshiram Manoharlal.

Saraswat, K.S. 2003. Plant Economy of Early Farming Communities. In *Early Farming Communities of the Kaimur (Excavations at Senuwar, 1986-87, 89-90)*, Vol. II. B.P. Singh (ed.): 416-535. Jaipur: Publication Scheme.

Sharma S., M. Joachimski, M. Sharma, H.J. Tobschall, I.B. Singh, C. Sharma, M.S. Chauhan and G. Morgenroth 2004. Late Glacial and Holocene Environmental Changes in Ganga Plain, Northern India. *Quaternary Science Reviews* 23 (1-2): 145-159.

Sharma, C., M.S. Chauhan, S. Sharma, M. Sharma and I.B. Singh 2001. Proxy Records of Holocene Vegetation and Climate Change from Sanai Tal, Central Ganga Plain, Uttar Pradesh. *National Symposium: Role of Earth Sciences Integrated Development and Related Social Issues*. Special Publication No. 65 (III): 199-202. New Delhi: Geological Survey of India.

Sharma, G.R., V.D. Misra, D. Mandal, B.B. Misra, and J.N. Pal 1980. *Beginnings of Agriculture*. Allahabad: Abinash Prakashan.

Singh, B.P. 1990. Early Farming Communities of Kaimur Foot Hills. *Puratattva* 19: 6-18.

Singh, B.P. 1997. Neolithic and Chalcolithic Pottery of Middle Ganga Plain: A Case Study of Senuwar. *Ancient Ceramics (Historical Enquiries and Scientific Approaches)*. P.C. Pant and Vidula Jayaswal (eds.): 3-33. New Delhi: Agam Kala Prakashan.

Singh, B.P. 2001. Stages of Cultural Development in the Middle Ganga Plain - A Case Study of Senuwar. *Pragdhara* 11: 109-118.

Singh, B.P. (ed.) 2004. *Early Farming Communities of the Kaimur (Excavations at Senuwar)*, Vol. I & II. Jaipur: Publication Scheme.

Singh, I.B. 1996a. Geological Evolution of Ganga Plain - An Overview. *Journal of Palaeontological Society of India* 41: 99-137.

Singh, I.B. 1996b. Late Quaternary Sedimentation of Ganga Plain Foreland Basin. *Proceeding. Symposium NW Himalaya and Foredeep. Feb. 1995*, Geological Survey of India, Special Publication No. 21 (1): 161-172. New Delhi: Geological Survey of India.

Singh, I.B. 2004. Late Quaternary History of the Ganga Plain. *Journal of Geological Society of India* 64: 431-454.

Singh, I.B. 2004-2005. Landform Development and Palaeovegetation in Late Quaternary of Ganga Plain: Implications for Anthropegenic Activity. *Pragdhara* 15:5-31.

Singh, I.B. 2005. Quaternary Palaeoenvironments of Ganga Plain and Anthropogenic Activity. *Man and Environment* 30 (1): 1-35.

Singh, P. 1991. *The Neolithic Origins*. Delhi: Agam Kala Prakashan.

Singh, P. 1992-93. Archaeological Excavations at Imlidih Khurd - 1992. *Pragdhara* 3: 21-35.

Singh, P. 1993-94. Further Excavations at Imlidih Khurd - 1993. *Pragdhara* 4: 41-48.

Singh, P. 2002. The Neolithic Cultures of Northern and Eastern India. In *Indian Archaeology in Retrospect Volume I: Prehistory (Archaeology of South Asia)*. S. Settar and Ravi Korisettar (eds.): 127-150. New Delhi: Indian Council of Historical Research and Manohar Publishers.Singh, P. and A.K. Singh 1995-96. Trial Excavations at Waina, District Ballia (U.P.). *Pragdhara* 6: 41-61.

Singh, P. and A.K. Singh 1997-98. Trial Excavations at Bhunadih, District Ballia (U.P.). *Pragdhara* 8: 11-29.

Singh, P., A.K. Singh and B. Singh 1994-95. Protohistoric Investigations in Ballia District, Uttar Pradesh. *Pragdhara* 6: 21-36.

Singh, P., A.K. Singh and Brahmanand Singh 1994-95. Protohistoric Investigations in Ballia District, Uttar Pradesh. *Pragdhara* 5: 21-35.

Singh, R.L. (ed.) 1971. *India: A Regional Geography*. Varanasi: National Geographical Society of India.

Sinha, H.P. 1994. *Archaeological and Cultural History of Bihar (with special reference to Neolithic Chirand)*. New Delhi: Ramanand Vidya Bhawan.

Tewari, Rakesh, R.K. Srivastava and K.K. Singh 2001-2002. Excavations at Lahuradeva, District Sant Kabir Nagar. *Puratattva* 32: 54-62.

Tewari, Rakesh, R.K. Srivastava, K.K. Singh, K.S. Saraswat and I.B. Singh 2002-2003. Preliminary Report of the Excavations at Lahuradeva, District Sant Kabir Nagar, U.P. 2001-2002: Wider Archaeological Implications. *Pragdhara* 13: 37-68.

Tewari, Rakesh, R.K. Srivastava, K.K. Singh, Ram Vinay, Rajiv Kumar Trivedi and G.C. Singh 2004-2005. Recently Excavated Sites in the Ganga Plain and North Vindhyas: Some Observations Regarding the Pre-urban Context. *Pragdhara* 15: 40-43.

Thapar, B.K. 1965. Neolithic Problem in India. *In Indian Prehistory: 1964*. V.N. Misra and M.S. Mate (eds.): 87-112. Poona: Deccan College Post-Graduate and Research Institute.

Thapar, B.K. 1984. *Fresh Light on the Neolithic Cultures of India*. *Puratattva* 13-14: 37-43.

Varma, A.K. 1998. *Neolithic Culture of Eastern India*. New Delhi: Ramanand Vidya Bhawan.

Verma, B.S. 1971. Excavations at Chirand: New Light on Indian Neolithic Complex. *Puratattva* 4: 19-24.

MOHD. NASEEM

The Neolithic Culture of the Saryupar Region

Neolithic is a sub-division of Stone Age having distinct technology to ground stone tools. The stone tools were made by polishing/grinding. Neolithic culture was defined as a cultural or economic stage when man not only fashioned ground stone tools but also produced food. Man began domestication of animals like cattle, sheep, goat, pig and dog. This stage is designated as "Food-Producing" stage. He cultivated cereals like wheat and barley. Such information is available from the west Asian Neolithic sites. He began to produce surplus food and it made him to lead a sedentary life. He was no longer hunter/gatherer and nomad. Knowledge of metal was unknown (Sankalia 1974: 279). Occurrence of a few copper/bronze objects is not important as they are not capable to transform the economic condition of the community but the knowledge of smelting of copper is important to change the economic condition of the society. Hence, Neolithic may not be defined only on technological, economical basis because the evidence of polished stone tool and domestication/cultivation is not found in the excavations. It may be defined as techno-social economical stage.

Present paper deals with Neolithic cultures of the Saryupar region. It is a part of the middle Ganga plain comprising mainly the present districts of Gorakhpur, Sant Kabir Nagar, Siddharth Nagar and a couple of tehsils of Gonda and Saran. Ghaghara, Manwar, Kuwana, Rapti, Ami and Chhoti Gandak are the main rivers of the region (Singh 1994: 7).

The alluvial tract lying between the Himalayan foothills in the north and the Vindhyan ranges in the south is known as the Ganga valley because the Ganga is the main drainage pattern of the region. The Ganga attained its present form during the post-Tertiary period when the trough was filled up by the alluvium. Its thickness varies from 1300 m to 1400 m (Singh 1971: 129). The Ganga flowed making new meanders and bursting old ones during pre-historic time. The ox-bow lakes came into existence from the old meanders and they control the morphology of the Ganga valley. Most of the smaller rivers of the central and eastern Uttar Pradesh originate from these lakes. These lakes provide the aquatic animals and lands around them were covered with wild grasses some of these being edible (Varma 1989: 5).

During the Holocene, the marshy land of the water-locked Ganga alluvium gradually transformed into good grassland and sprouted with new grasses. The condition must have attracted animals living on grasslands and human populations from the Vindhyas as shown by the archaeological excavations of Sarai Nahar Rai, Mahadaha and Damdama in Pratapgarh district. The entire Ganga plain receives good rainfall. More than 60% of the total area is under cultivation (Singh 1994: 5).

The characteristic features of the Neolithic cultures are described below:

Sohagaura: It is a big village located on the confluence of the rivers of Rapti and Ami. Total cultural deposit thickness is 4.40 m and is divided into four periods, where period I is Neolithic (Chaturvedi 1985: 103).

The thickness of Period I is 70 cm. The pottery is handmade and corded or rusticated. Cord impression occurs on the external surface of the vessels. A solitary fragmentary baked terracotta discoidal object with lenticular section and diameter of 13.5 cm has been found from this level. People practiced rice farming as indicated by presence of husk of wild and cultivated rice used as degraissant in preparation of the clay for manufacturing pots. It is dated from beginning of first half of the third millennium BC to 1900 BC (Chaturvedi 1985: 101-107).

Imlidih: It is also in the district of Gorakhpur and extends in an area of 6-8 hectares. Period I is called as pre-Narhan culture, after the excavations at Narhan (district Gorakhpur). The cultural deposit is 50-60 cm (Singh 1992-93: 23). Considering the thickness of cultural deposit its beginning may be kept in between 3000 BC to 2000 BC.

Pottery comprises crude red ware and plain red wares. Crude red ware bears cord impressions on the external surface. The vessels are not properly baked (Singh 1992-93: 23-24). People used to live in the huts of wattle-daub. Many pieces of the clay have been encountered with reed impressions. Mud floors with oven and *chullah* were found in the excavations. A circular pit with a diameter of 1.95 m has been discovered in the natural soil which was probably used as bin or *silo* to store surplus produce. Other important finds include steatite micro-beads, beads of terracotta and stone, bone points and pottery disc (Singh 1992-93: 24-31).

Faunal remains consist of cattle, sheep and goat. Cattle predominates and bear cut-marks. People enjoyed hunting as shown by the presence of hog, deer and possibly wolf. The aquatic fauna include fresh water turtle, fresh water mollusca and fish. It indicates that people passed their time in fishing as well as catching these creatures (Singh 1992-93: 31).

The Neolithic settlers of Imlidih cultivated cereals like rice, barley, wheat, *jowar*, millet, *bajra*, pearl millet. The pulses like lentil, green gram, field pea, and grass pea have also been found. Oil seeds include mustard, *til* and sesame. It shows that people practiced two crops in a year. *Jowar* and *bajra* are especially noteworthy as they are African origin. They were cultivated by the Harappans. Cultivation of these grains must have reached in this region through the intermediaries like the Ochre coloured pottery people of the western Uttar Pradesh (Singh 1993-94: 47).

Lahuradeva: It is located in district of Sant Kabir Nagar. Remains of cultural deposit are divided into five periods. Period I is Neolithic and is divided into sub-periods I-A and I-B.

Period I-A: It is 40-45 cm thick. Pottery consists of coarse variety of handmade red ware and black-and-red ware with cord impressions on the exterior surface (Tewari *et al*. 2006: 36). Post holes are found from the lowest levels and suggest the construction of hut. Burnt clay chunks with reed and straw marks show the preparation of walls with wooden frame plastered with mud. Drain connected with two large and deep depressions (ditches) has been uncovered. The gradient of channel is from north to south (Tewari *et al*. 2006: 40).

The dietary habit can be shown by presence of bones of fish and turtle (Tewari *et al*. 2006: 46). Both wild and domesticated varieties of rice were found (Tewari *et al*. 2006: 36). It shows that the inhabitats were engaged in its cultivation.

Period I-B: Deposit is 45 cm thick. Pottery is characterized by the presence of new shapes-beaker, perforated vessels, spouted vessels and dish or bowl on stand. Black-and-red ware continued. Inhabitants lived in huts of wattle-daub. Other artifacts include terracotta and stone beads, and a few micro steatite beads (Tewari *et al*. 2006: 36).

A copper arrowhead and fish hook are reported from the lower levels of Period I B. Fish and turtle bones, bone awl, a broken bone/antler bangle and a stone scraper have also been found (Tewari *et al*. 2006: 42-46). Radiocarbon dating from the lowest deposit of Period I A shows the beginning of settlement took place in about 6000 BC here.

Chirand: It is in the district of Saran (Bihar). The cultural materials of Period I is Neolithic. People lived in the hut made of wattle and daub (Verma 1970-71: 22). Bone tools are recovered in huge number. They have also been reported at Burzahom but typologically they are entirely different. They include celts, scrapers, chisels, hammers, needles, points, borers, awls, pins, etc. (Verma 1970-71: 19).

Besides, bone ornaments, polished stone axes, microliths, terracotta and stone beads and hand made red ware, grey ware, and black and red ware have also been found (Verma 1970-71: 19-20).

People cultivated rice, wheat, barley and *moong*. They practiced two crops in a year. Domestication of buffalo and ox was prevalent. Aquatic animals like fish, shells and snails were eaten. They were also engaged in hunting of wild animals, *e.g.*, stag, deer, bird, etc. This period is dated to *c.* 1900 BC to 1300 BC (Verma 1970-71: 22).

The above description shows that Neolithic culture started in *c.* 7000-6000 BC at Lahuradeva. Use of copper is absent from the early levels of Neolithic at Lahuradeva, Sohagaura, Imlidih and Chirand. People enjoyed sedentary life and used to live round the year on those sites because they practiced farming, domestication and fishing hunting. These modes maintained regular supply of subsistence.

BIBLIOGRAPHY

Chaturvedi, S.N. 1985. Advance of Vindhyan Neolithic-Chacolithic Cultures to the Himalayan Tarai - Excavation and Explorations in the Saryupar Region of Uttar Pradesh. *Man and Environment* 9: 101-108.

Sankalia, H.D. 1974. *The Prehistory and Protohistory of India and Pakistan*. Poona: Deccan College Post-Graduate and Research Institute.

Singh, R.L. (ed.) 1971. *India: A Regional Geography*. Varanasi: National Geographical Society of India.

Singh, P. 1992-93. Archaeological Excavations at Imlidih Khurd, 1992. *Pragdhara* 3: 21-35.

Singh, P. 1993-94. Further Excavations at Imlidih Khurd 1993. *Pragdhara* 4: 41-48.

Singh, P. 1994. *Excavations at Narhan (1984-89)*. Varanasi and Delhi: Banaras Hindu University and B.R. Publishing Corporation.

Tewari, R., R.K. Srivastava, K.K. Singh, K.S. Saraswat, I.B. Singh, M.S. Chauhan, A.K. Pokharia, A. Saxena, V. Prasad and M. Sharma 2006. Second Preliminary Report of the Excavations at Lahuradewa, District Sant Kabir Nagar, U.P. 2002-2003-2004 and 2005-06. *Pragdhara* 16: 35-68.

Verma, B.S. 1970-71. Excavations at Chirand: New Light on the Indian Neolithic Culture Complex. *Puratattva* 4: 19-23.

Varma, R.K. 1989. Pre-Agricultural Mesolithic Society of the Ganga Valley. In *Old Problem and New Perspectives in Archaeology of South Asia*. R.A. Bryson (ed.): 1-10. Madison: Tames and Hudson.

K.S. SARASWAT

Agricultural Background of the Early Farming Communities in the Middle Ganga Plain

Introduction

Today there are few areas in India comparable to the middle Ganga plain where knowledge of early human past is growing so rapidly and over so broad archaeological spectrum. Questions that until recently could hardly be asked, about chronologies of settlements, diffusion and cultural change on the ceramic typology, physical environment as a case for the cultural development, man and plant/animal relationship, metallurgy, and several other problems not hitherto been discussed, are today to find answers and alternative interpretations for the reassessment of the earlier work done in the region. While these developments are certainly welcome, they still engage the attention of relatively few archaeologists; in part, perhaps, because they have in fact heeded to call for orientation toward broad cultural issues than the conventional concern with the problems of cultural sequence and chronology of archaeological settlements. The present workshop has done much to bring together workers with a great diversity of specialist interests, those who have contributed formally to the discussion on the archaeology of middle Ganga plain and those who have been with us and participated in informal ways. I am led, by my own interest, to focus mainly on the state of the complex pattern of agriculture during the broad time bracket from the middle of 3rd millennium BC to 200 BC, with an objective to discuss the crop

---

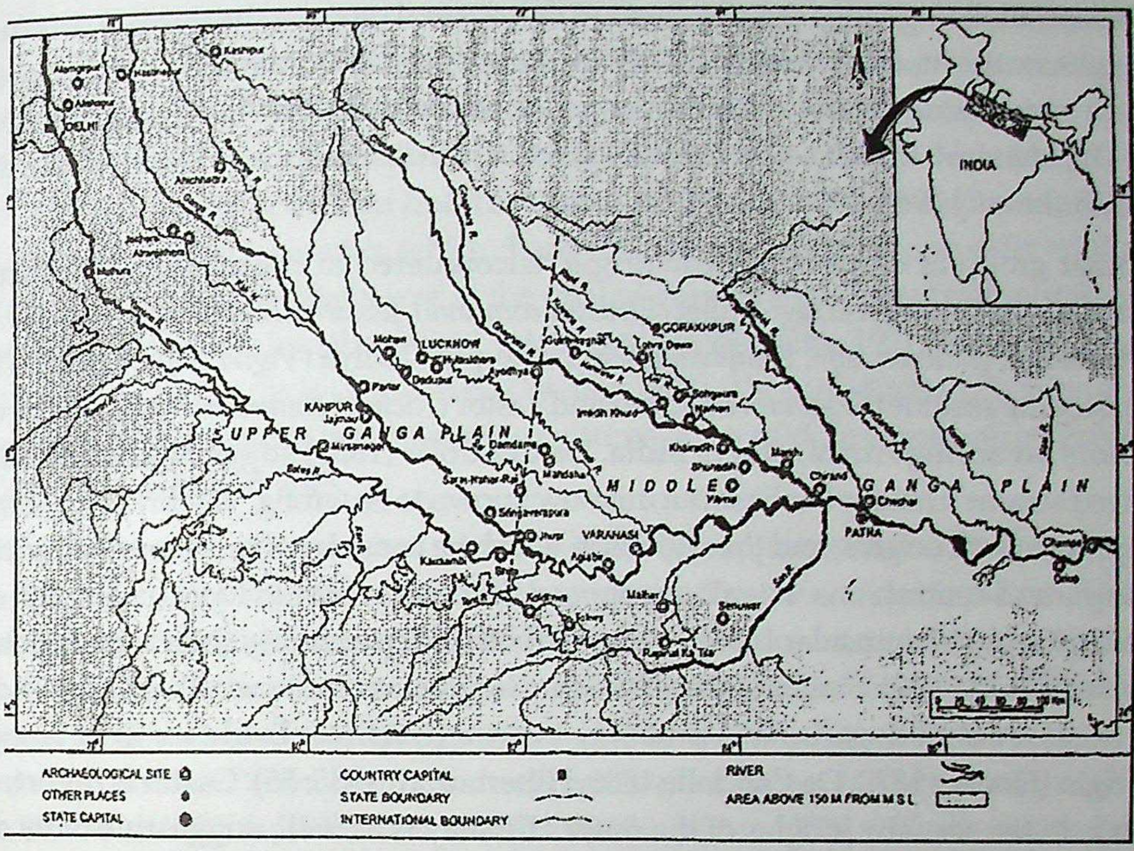
* The paper is being reproduced from *Pragdhara* 15 with kind permission of the author and the editor of the journal.

dispersals and the agricultural systems in the regional settlements of Neolithic and Chalcolithic designations. Regional groups of these early settlements shared common material traits which indicate cultural affinities within the region and, in some instances, suggest connections with some other distant regions beyond the middle Ganga plain. Eventually, with the introduction of iron, these early settlements developed into the culmination of second urbanization in India during the first millennium BC to which Chakrabarti (1972-73: 27-36) attributed "a local agricultural base" in addition to "an organized trading activity and a centralized power-structure".

Formerly, plant remains incidentally noticed in the excavations were used to be submitted to a botanist for specific identification. Many archaeologists, until recent years, did not seriously look for the plant remains. As a result, even potentially rich sites also yielded too little to be convincing. The information, howsoever important it would have been, remained inadequate. The development in the region of middle Ganga plain and elsewhere, to a large extent during last 20 years, has been due to a credit of some archaeologists to realize the importance of botanical remains in shaping the economic potential of cultural settlements. This enabled me to systematically generate data, contributing to a much broader understanding of the ways in which pre-historic and proto-historic people in the region, may have exploited useful plants in their environment, and to the reconstruction of agricultural economy and the shifts in the importance of crop plants. Here I bring up for discussion the exploitation of different field crops salvaged during the excavations at only seven selected cultural settlements in diverse locations (Map 1), exposing to view the varied phases of Neolithic, Chalcolithic and Iron-Age Cultures in the region, from about 2200 to 200 BC. The excavations at Senuwar, district Rohtas, Bihar (Singh 1990: 6-18; Singh 2004); at Imlidih-Khurd and Narhan in district Gorakhpur, U.P. (Singh *et al.* 1992: 120-122; Singh 1993: 21-36; 1994a: 41-48; 1994b); and at Waina (Singh and Singh 1996: 41-61) and Khairadih (Singh 1989: 28-34) in district Ballia of U.P., have been carried out by the B.H.U. Department of Ancient Indian History, Culture and Archaeology, Varanasi. Malhar in Chandauli district and Raja-Nala-ka-Tila in Sonbhadra district are the sites in strikingly divergent Vindhyan plateau regions of south-eastern U.P., excavated by the U.P. State Archaeology Department, Lucknow (Tewari. *et al.* 2000: 69-98; Tewari and Srivastava 1997: 77-95; Tewari and Srivastava 1998: 99-106; Tewari. *et al.* 2004). Radiocarbon dates have been obtained for the cultural stages at Senuwar, Narhan, Malhar and Raja-Nala-ka-Tila. However, chronology of cultural sequences at Imlidih-Khurd, Waina and Khairadih are presently rested on cultural-stratigraphical grounds, as estimated by the excavators. Obviously, what we need are sequences of good dates from these sites, to securely establish chronological successions and for supporting the contented archaeological data. I expect, the ages of Imlidih-Khurd, Khairadih and Waina settlements may be pushed back in time.

State of the Agriculture and Crop Complexes in the Archaeological Context

Summary of the finds of 29 species of the crop plants from these seven sites is presented in


DELHI
LUCKNOW
KANPUR
GORAKHPUR
VARANASI
PATNA
UPPER GANGA PLAIN
MIDDLE GANGA PLAIN
INDIA
ARCHAEOLOGICAL SITE
OTHER PLACES
STATE CAPITAL
COUNTRY CAPITAL
STATE BOUNDARY
INTERNATIONAL BOUNDARY
RIVER
AREA ABOVE 150 M FROM M S L

Map 1. Important early archaeological sites located in upper and middle Ganga plain (Uttar Pradesh & Bihar)

Table 1. The region of Ganga plain received loans of a large number of crops of almost all kinds, cultivated in the present times, and seem to have been exploited apparently in the same way but in different technological circumstances of early cultural groups. In view of the ecological requirements of particular crops, the technological complexities would have inevitably directly concerned with the early agricultural pattern. One group, of which rice is most important, has its wild relatives in India and can be assumed to have been domesticated indigenously. Other than rice *(Oryza sativa)*, crops in this category include the remains of kodon-millet *(Paspalum scrobiculatum)*, horse-gram *(Macrotyloma uniflorum)*, green-gram *(Vigna radiata)*, black-gram *(Vigna mungo)*, moth-bean *(Vigna aconitifolia)*, field-brassica *(Brassica juncea)*, and sem *(Lablab purpureus)*. The second is a major group of crops related to their wild I relatives in the Mediterranean zone. These crops in the archaeological record, include the remains of barley *(Hordeum vulgare)*, dwarf-wheat *(Triticum sphaerococcum)*, bread-wheat *(Triticum aestivum)*, lentil *(Lens culinaris)*, field-pea *(Pisum arvense)*, grass-pea *(Lathyrus sativus)*, chick-pea *(Cicer arietinum)*, linseed *(Linum usitatissimum)*, safflower *(Carthamus tinctorius)*, etc. Wheat and barley, which are the major cereal crops, were regarded earlier to have been introduced from west Asia through established agricultural systems. The early domestication of wheat and barley and the process of Neolithic evolution at Mehrgarh in the Baluchistan region, have now indicated the beginning of the initial

cultivation and the indigenous development of these cereal crops in the north-western regions of Indian sub-continent, from as early as 7000 BC, contemporarily with the Neolithic revolution in west Asia and outside the narrower limits suggested earlier by Vavilov (Jarrige and Meadow 1980: 102-110; Meadow 1984: 34-40; Costantini 1984: 34-40; Costantini and Costantini 1985: 16-30, tables 4-7; Zhukovsky 1968: 430-460).

Another group of crops of African origin, encountered in the archaeological record of middle Ganga plain, comprise *ragi*-millet *(Eleusine coracana)*, *jowar*-millet *(Sorghum bicolor)*, pearl-millet *(Pennisetum glaucum syn. P. typhoides)* and cow-pea/lobiya *(Vigna unguiculata)*. The areas of the origin of the sesame *(Sesamum indicum)* and castor *(Ricinus communis)* appear unresolved, some authors favouring Africa, others India. De Candolle (1886) suggested, that India might have received sesame from the Far East, but this now known to be wrong. Vavilov (1951) considered it to be of polyphyletic origins, and the regions in which he considered sesame to have originated were Ethiopia and central Asia. It is also proposed that sesame could have originated either in Ethiopian region or in Peninsular India, or even in both independently (Nayar and Mehra 1970: 20-31; Nayar 1976: 231-233). Similarly there is some disagreement as to whether truly wild species of castor exist or not; if they do, it is probably in eastern Africa. Evidence is in favour of an African origin (Hooker 1878; De Candolle 1886; Hilterbrandt 1935: 55). Castor is reported to run in wild state in the scrubby jungles of the outer Himalayas as well, suggestive of its origin in Indian region (Fluckiger and Hanbury 1892; Watt 1892; Hutchinson 1976: 129-141). Castor is widespread as a wild plant throughout East and North Africa, the Yemen, the Middle East and India (Mehra 2003: 79-98). On archaeological ground, its presence from Badarian culture of Egypt during the first half of 4th millennium BC (Arkell and Ucko 1965: 145-56) is much earlier to the ancient records in India, during second-first millennia BC. There is likelihood that the castor might have reached Egypt at much early date from African region, and further spread widely and took on a variety of forms. Presence of castor in the archaeological record from the middle Ganga plain is recorded by its wood charcoals (Table 1). Phut/kheera *(Cucumis melo)* and watermelon *(Citrullus lanatus)*, recorded in the crop assemblage, are also decidedly African domesticates. *Cucumis melo* is truly wild in eastern tropical Africa and exploded into numerous cultivars in India. *Citrullus lanatus* is reported to be feral in the warmer regions but it is truly wild or native only in sandy and dry areas of South Africa, mainly in Kalahari Desert (Whitaker 1976: 64-69). These were also grown, for their luscious fruits, in the middle Ganga plain.

Cotton was grown by early farming communities in the region of middle Ganga plain. The genus comprise thirty tropical and sub-tropical species in the Old World. *Gossypium herbaceum* - race *africanum*, distributed in the savanna vegetation of South Africa, was probably first cultivated in Arabia and Syria before finding its way to the Indian sub-continent where G. *arboreum* had differentiated under cultivation in north-western India and Pakistan (Santhanum and Hutchinson 1974: 89-100; Phillips 1976: 196-200).

In the advancing state of our knowledge on the field-crops, onion *(Allium cepa)* seeds have also been encountered (Table 1). In this group of onion and allies, the remains of garlic cloves were already recovered at Balu in Haryana during mature Harappan time (Saraswat and Pokharia 2002: 153-171). Evidence of onion from Waina (1600 - 800 BC) and Raja-Nala-ka-Tila (1300 - 700 BC), and the remains of sem from Imlidih-Khurd (1300 - 800 BC), would be subject to the very operations in agricultural practice which characterize horticulture. Supposedly wild *Allium cepa* in western Asia was more likely one of the related species that range from northern Iran and Afghanistan, northwards into the central Asiatic region (Wendelbo 1971: 100). The primary center of origin of onion and garlic is central Asia (Vavilov 1951). The introduction of onion encountered in the archaeological lexicon in the farming cultures of the middle Ganga plain, is considerably gratifying to be reckoned with.

In the acquired archaeological record of the field-crops generated from seven sites in the region, it becomes apparent that in addition to the indigenous crops in which rice was most important, a substantial expansion in the kinds of subsistence resources of the Mediterranean, central Asian and African regions made considerable dynamism in the agricultural economy. Already our information on the remains of the crop plants from a large number of sites in northern, north-western and the Peninsular Indian regions has been considerably increased (Kajale 1991: 155-189; Saraswat 1992: 514-545; Mehra 1997: 105-126; Mehra 2002). Of further added importance in the middle Ganga plain are the records of Eurasian millets, belonging to *Setaria italica* (Italian/ foxtail-millet) and *Panicum miliaceum* (panic-millet). What we do know clearly that both of these millets had been the staff of life for Yang-shao people in China about 6000 years ago. These have been regarded as native Chinese plants (De Candolle 1886; Vavilov 1951; Hsi-an Pan-p 'O 1963; Ho 1969: 1-36; Ho 1977: 413-481), yet found in Neolithic sites over Europe through 6th millennium BP (Murray 1970). At any rate these millets habituate to the vast areas of summer rainfall in temperate Eurasia, and there are no other crops with such a distribution in that time range. Whether these were domesticated in the West and moved forward to China, remains confusing. Their independent domestications seem to be likely explanation (Harlan 1977: 357-383). Main concern of future work will be to draw attention to the long distance migration of crops in the region.

Archaeologists, of course, are concerned with the sites. The accidental finds of the food-grains have produced indirect evidence about what was going on in the surrounding landscapes, and have made it possible to infer what the regional pattern of agriculture was. The bulk of carbonized grains and seeds in all these seven sites of different cultural occupations spanning from about second millennium BC to nearly the time of Christ, denotes a highly developed state of arable agriculture, which requires foresightness and planning, and also timeliness. Fundamental principles of the rotation of crops would have been the same, more or less as these are in the present times. This state of agricultural occupation was an obvious continuation from still earlier vocation, during the spread and adaptation of people and their lifestyles, in reconciliation to the local ecological conditions around the settlements in the region. In view of the contrasting ecological requirements of particular crops, the technological complexities seem to be directly concerned with the agricultural pattern. The agricultural practices would indubitably have demanded the capacity of early farmers to measure in space and time, to survey the land and to use the calendar. We may safely presume that measuring farming communities came up in existence in the region of middle Ganga plain. The evolution of our modern agricultural societies in the middle Ganga plain appears to have been inevitably from the more than 4000 year old early farming communities.

The record of crop remains (Table 1) shows that even the simple and unpretentious people in the initial non metallic phases of occupations, characterized by black & red and cord-impressed potteries of Neolithic traits on some sites, practiced persistently self-sustaining arable agricultural system, characterized by the rotation of crops. Cultivation of rice is obvious as the region is one of the hearths of the domestication of this most staple crop in south and south-eastern Asia. Rotation of crops becomes remarkably apparent from Senuwar (Pd. IA), Imlidih Khurd (Pd. I) and Malhar (Pd. I) that the farmers could successfully exploit the land resources for the sufficient means of agriculture, regardless of the use of any metallic tools. This achievement of Neolithic communities in the region of middle Ganga plain is incontestably evident by the cultivation of *jowar*-millet, *ragi*-millet, horse-gram, green-gram (*moong*), etc. as summer crops and barley, two forms of wheat, lentil, field-pea, grass-pea (*khesari*), *til*, Indian-mustard and linseed as the winter crops in the region, around second millennium BC and may be still earlier on some sites. The Neolithic way of these farmers during this period, seems to have sought succession from the earlier stages of Neolithic culture, far ahead in time. Substantially meaningful is that, in addition to the indigenous crops, nearly all the important crops of Mediterranean and African regions were assimilated in the double cropping system of Neolithic people. I feel no surprise to state that the agriculture in the metal-free stage of Neolithic set the desired foundation of economic base for the Chalcolithic and Iron-using cultures which were to follow, simply to upgrade the economy by the larger selection of crops. We are beginning to see also that what distinguishes the idealized, simple Neolithic from the more complex societies which followed them was not so much in their food production techniques. The expansion of agriculture facilitated by the copper and iron tools apparently provided only an additional "techno-environmental efficiency", as put forward by Harris (1975). Primitive Neolithic societies managed without market or exchange rates or commercial trade at all. The exchange on a reciprocal basis, in all likelihood a means of reinforcing amiability and hence largely a social transaction, did have the effect of allowing the circulation of some goods hand to hand. One of the emerging key features of more complex societies of the following times would have been that these activities were, in all likelihood, carried out by specialists. A crucial point in the social organization of Chalcolithic and Iron Age farming societies would have been in commercial manner in which goods were exchanged, for

Table 1

Crop Remains from Some Archaeological Settlements in the Middle Ganga Plain

CROP REMAINS	SENUWAR (Rohtas, Bihar)			IMLIDIH-KHURD (Gorakhpur, U.P.)			NARHAN (Gorakhpur, U.P.)			WAINA (Ballia, U.P.)		KHAIRADIH (Ballia, U.P.)		MALHAR (Chandauli, U.P.)z		RAJA-NALA-KA-TILA (Sonbhadra, U.P.)	
	Period- IA: 2200-1950 BC	Period IB: 1950-1300 BC	Period II: 1300-600 BC	Period I: 2000-1400 BC Approx.	Transitional Phase 1400-1300 BC	Period II: 1300-800 BC	Period-I: 1300-800 BC	Period-II: 800-600 BC	Period III: 600-200 BC	Period-I 1600-800 BC	Period - II 800/600BC	Period -I: 2000-800/700BC	Period - II 700/600-200 BC	Period-I 1900-1700/1600 BC	Period-II 1700/1600-800 BC	Period -I: 1600-1300 BC	Period-II: 1300-700 BC
Rice (*Oryza sativa*)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Barley (*Hordeu vulgare*)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Dwarf-wheat (*Triticum sphaerococcum*)	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●
Bread-wheat (*Triticum aestivum*)		●	●	●	●	●	●		●	●	●		●	●	●	●	●
Ragi-millet (*Eleusine coracana*)	●					●					●				●	●	●
Jowar-millet (*Sorghum bicolof*)	●	●	●	●		●					●		●		●		●
Kodon-millet (*Paspalum scrobiculatum*)			●			●	●		●	●				●			
Italian-millet (*Setaria italica*) Panic-millet (*Panicum cf miliaceum*)																●	●
Panic- millet (Panicum of miliaceum)																	
Pearl-millet (Pennisetum glaucum; Syn. P. typhoides)					●	●											
Lentil (*Lens culinaris*)	●	●	●	●	●	●	●			●	●	●	●	●	●	●	●
Field-pea (*Pisum arvense*)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Grass-pea (*Lathyrus sativus*)	●	●	●	●		●	●		●	●	●		●	●	●	●	●

contd.

CROP REMAINS	SENUWAR (Rohtas, Bihar)			IMLIDIH-KHURD (Gorakhpur, U.P.)			NARHAN (Gorakhpur, U.P.)			WAINA (Ballia, U.P.)		KHAIRADIH (Ballia, U.P.)		MALHAR (Chandauli, U.P.)		RAJA-NALA-KA-TILA (Sonbhadra, U.P.)	
	Period- IA: 2200-1950 BC	Period IB: 1950-1300 BC	Period II: 1300-600 BC	Period I: 2000-1400 BC Approx.	Transitional Phase 1400-1300 BC	Period II: 1300-800 BC	Period-I: 1300-800 BC	Period-II: 800-600 BC	Period III: 600-200 BC	Period-I 1600-800 BC	Period - II 800/600BC	Period -I: 2000-800/700BC	Period - II 700/600-200 BC	Period-I 1900-1700/1600 BC	Period-II 1700/1600-800 BC	Period -I: 1600-1300 BC	Period-II: 1300-700 BC
Horse-gram *(Macrotyloma unitlarum;* Syn. *Dolichos bitlcrus)*		●	●	●	●	●	●			●	●		●		●		●
Green-gram *(Vigna radiata)*		●	●	●	●	●	●	●	●	●	●		●	●	●	●	●
Black-gram *(Vigna mungo)*									●								
Moth-bean *(Vigna aconitifolia)*			●			●	●						●				●
Cow-pea *(Vigna unguiculata)*	●					●					●		●				●
Chick-pea *(Cicer arietinum)*		●	●			●				●			●				●
Sem *(Lablab purpureus)*				●		●											
Til *(Sesamum indicum)*			●	●		●	●		●				●				●
Field-brassica *(Brassica juncea)*			●	●		●	●			●	●	●	●				●
Safflower *(Carthamus tinctorius)*			●			●		●			●						●
linseed *(Linum usitatissimum)*			●	●		●	●				●		●				●
Castor *(Ricinus communis)* wood charcoal			●			●											
Cotton *(Gossypium arboreum/ herbaceum*						●				●							

contd.

CROP REMAINS	SENUWAR (Rohtas, Bihar)			IMLIDIH-KHURD (Gorakhpur, U.P.)			NARHAN (Gorakhpur, U.P.)			WAINA (Ballia, U.P.)		KHAIRADIH (Ballia, U.P.)		MALHAR (Chandauli, U.P.)		RAJA-NALA-KA-TILA (Sonbhadra, U.P.)	
	Period- IA: 2200-1950 BC	Period IB: 1950-1300 BC	Period II: 1300-600 BC	Period I: 2000-1400 BC Approx.	Transitional Phase 1400-1300 BC	Period II: 1300-800 BC	Period-I: 1300-800 BC	Period-II: 800-600 BC	Period III: 600-200 BC	Period-I 1600-800 BC	Period - II 800/600BC	Period -I: 2000-800/700BC	Period - II 700/600-200 BC	Period-I 1900-1700/1600 BC	Period-II 1700/1600-800 BC	Period -I: 1600-1300 BC	Period-II: 1300-700 BC
Phut/Kheera (*Cucumis melo*)						●	●										
Water-meon (*Citrullus lanatus*)			●			●											
Onion (*Allium cepa*)										●							●

without exchange of some kind the craft specialization was impossible to come up. This inclination in trade is spasmodically reflected by the presence of some cherished and imported items, such as grapes (raisins), dates, *chiraunji*, *jaiphal* (nutmeg), sandalwood, etc. in the Chalcolithic and Iron using cultures at Narhan and Khairadih, datable from 1300 - 200 BC (Saraswat 1992: 514-545; Saraswat *et al*. 1990: 122-125; Saraswat *et al*. 1994: 255-346). These finds, on botanical ground, affirm the well knit organization of commerce and trade in the farming communities of middle Ganga plain.

Most of us are familiar that wheat, barley, lentil, field-pea, chick-pea (gram), *jowar*-millet, *ragi*-millet, Italian-millet, etc. are the main components of farming of the Harappan culture-complexes in the north-western regions of India, during 3rd-2nd millennia BC. Earlier, these crops in the Ganga plain were recorded later than their occurrence in Harappan times. Now, significant advances in record of agriculture in the region appear by the influences from north-west, much earlier during 3rd millennium BC. Recently the sign of crucial economic change in the dietary of rice-growing Neolithic occupants at Lahuradewa in Sant Kabir Nagar district in middle Ganga plain, has become strikingly noticeable by the presence of barley, in the level dated to 4170 ± 180 yr BP: Cal. BC 2700 (Saraswat and Pokharia 2004: 46-47). However, AMS radiocarbon date of a barley grain, determined at Physikalisches Institut der Universitat Erlangen-Nurnberg (Germany), came out to be 2345 - 2000 BC (av. 2273 BC). Here, one has to keep in mind that radiocarbon is not a precise chronological tool as hoped by many archaeologists. Dates provide reasonable estimates of chronology with built-in ranges of variation and error factors. Current problems quite possibly may be attributed more to the archaeological interpretation of dates, than the dates themselves. Another unusually astonishing find of barley in association of domesticated rice is incidentally from Mesolithic Damdama in Pratapgarh district (Saraswat 2004: 47), which is involved in our arguments against placing too much thrust only in the early post-Pleistocene sequences, but also favour of much later continuance of the Mesolithic way of life at this site. AMS radiocarbon date of barley from Damdama, determined at the aforesaid laboratory, looks at 3984 ± 54 yr BP (2578 - 2458 BC). There should be no dispute, however, that the staple crop of barley in the Harappan zone of north-west, spread quite early in the rice-growing regions of the middle Ganga plain. Unaided by the other types of archaeological evidence, the barley grains have emerged the lively focus on the occurrence of Harappan crops in the middle Ganga plain, by the time of the emergence of mature Harappan phase (2600 - 2500 BC) in the north-western India.

For a long, the crop remains of Harappan nutritional traits recorded in early archaeological context of the middle Ganga plain were casually referred as having been spread in the region, without calling focus of thoughts on anthropological comprehensions in the early farming communities. This thought incidentally held water during the course of collecting carbonized remains from excavations at Senuwar in Bihar, where a faithful documentation in two trenches led to demonstrate a shift from the conventional rice growing Neolithic economy, to a juncture at which gradual incorporation of wheat, barley, lentil, etc. could be axiomatic. This stage in the stratigraphical continuum of Neolithic deposit may plausibly have resulted from the progressive inclination of inhabitants, to improve their rice based economy (Saraswat 2004: 416-535). Neolithic crop economy at Senuwar added a little more to the traditional picture. Although it is not possible in normal course to maintain excavation solely for the sake of retrieval of plant remains. In the trench SNR-2J the collection was made with the co-operation of excavator from 32 subsequent close digs at different depths within 1.94 m thick deposit of Neolithic occupation (Fig. 1). Using this criterion, I hoped to place more confidence in the representativeness, both in homogeneity and heterogeneity of the samples of food grains, at different horizons in a chronological order. Therefore, more certainty in the data, with which the changes at precise levels, could be achieved in the components of subsistence during 2200 - 1950 BC*. In another trench SNR-2GH, the Neolithic deposit measured about 1.03 m in thickness, and the sampling in accordance to the routine pattern of excavation further enabled me to observe the same changes in the assemblage of food grains (Fig. 2).

Grains of cultivated rice *(Oryza sativa)* and foxtail grass *(Setaria* cf. *glauca)* have been found to frequently occur in the lower half of the Neolithic deposit in trench SNR-2J. However, about

---

* It is prerogative of the excavator to place Period IA (Neolithic) of Senuwar, between 2200 BC and 1950 BC. The author feels to relax this time-frame from 2200 BC to 1800 BC, as suggested by the excavator earlier (See *Puratattva* 19: 18).

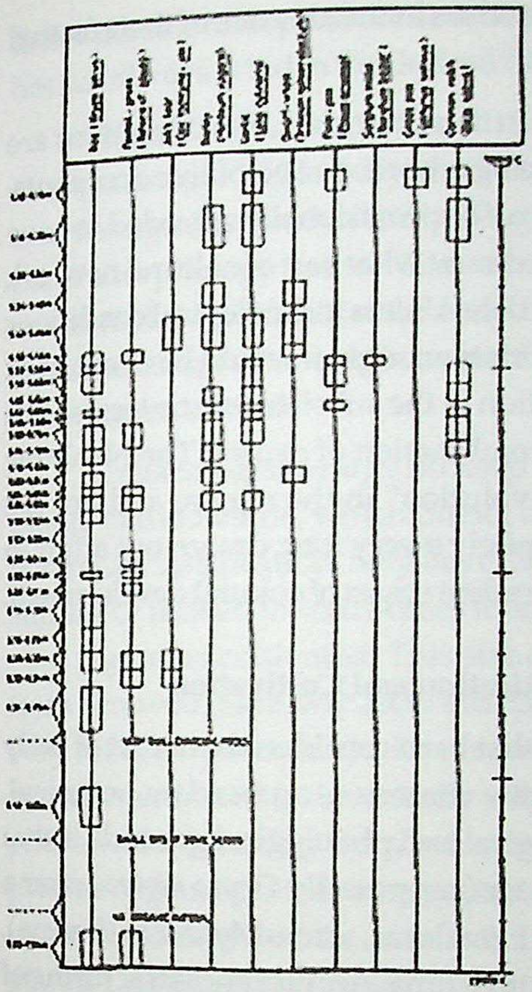


Fig. 1. Chronological sequence of cereals and legumes

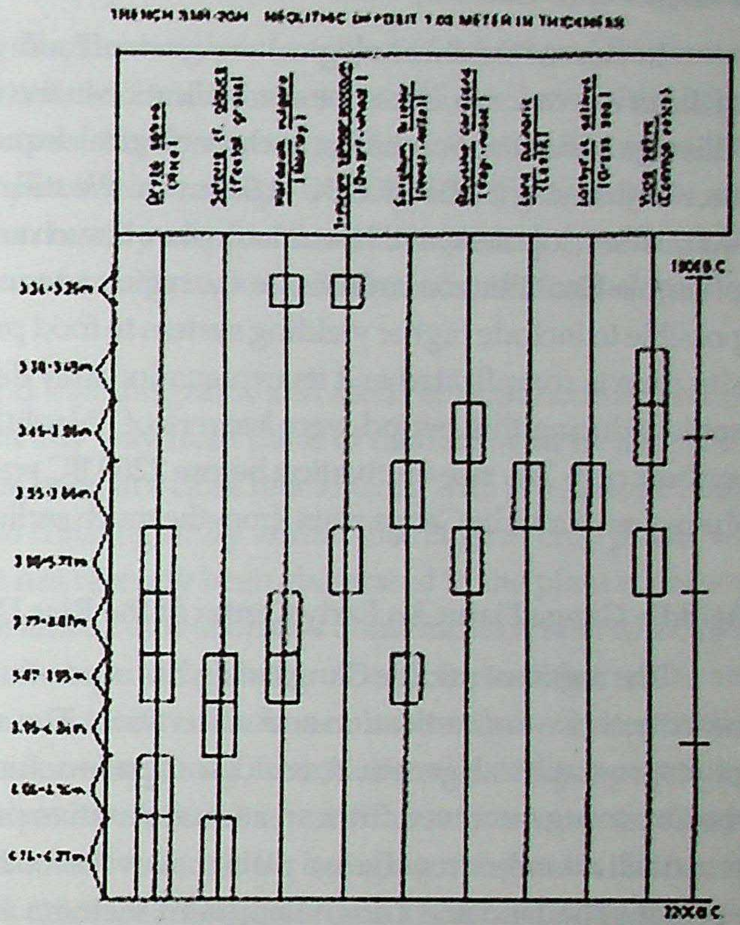


Fig. 2. Chronological sequence of cereals and legumes

70 cm above from the bottom layer, inclusion of job's tear *(Coix lachryma-jobi)* has been marked. Like the foxtail grass, job's tear is also a grass of common occurrence in the region. Grains of both the grasses are considered to be wholesome. The settlers during the early phase of their occupation, may be regarded to have cultivated the rice and subsisted on these minor cereals of presently wild occurrence. These minor cereals were very important at one time in the traditional diet throughout the region, gathered and eaten by the tribals in Bihar and Orissa. The earliest sign of a crucial economic change in agriculture and the dietary of Neolithic people is noticeable in almost the middle of occupational phase, by the incidental appearance of barley *(Hordeum vulgare)*, and lentil *(Lens culinaris)* at the depth of 5.86-5.90 m (Fig. 1). From this level onward, the subsequent change is noticed by the incidental inclusion of dwarf-wheat *(Triticum sphaerococcum)*, field-pea *(Pisum arvense)*, *jowar*-millet *(Sorghum bicolor)* and grass-pea *(Lathyrus sativus)*, up to the top of deposit. Although common vetch *(Vicia sativa)* does not belong to the category of pulse crops; it is an obtrusive weed of common occurrence in the pulse-crop fields. It is also shown to figure, as

providing a circumstantial evidence for the cultivation of pulses in the absence of their factual evidence encountered.

In view of the chronological sequence of food-grains in these trenches, considerations are of direct relevance to assess the diversification in the advancing economy of Neolithic occupants. This sign of substantial change in chronological sequence may be provisionally regarded to have occurred during 2100 - 2000 BC at Senuwar. We still need to know what sort of cultural network led this development, and how it took place at such an early date. Unless technological conditions of simple Neolithic communities in the region were appropriate enough, it would have not been possible to include higher yielding system to food production in the subsistence strategies. The situation is complicated and its explanation may lie in a combination of causes. The Neolithic settlers during this period were bearers of "Neolithic Revolution" in the region, and not the authors of it. The rice-cultivation before 2200 BC was definitely a very long drawn out affair in the region of middle Ganga plain, from the much earlier antecedent stages of cultural development.

Middle Ganga Plain: An Early Center of the Rice Domestication and Cultivation

The region of middle Ganga plain has at one time or other been considered as a part of early hearths of rice domestication and cultivation. The aggregate consensus aroused on botanical, phytogeographical, genetical, ecological, palaeoclimatological and philological grounds is that the *Oryza sativa* evolved from an annual putative progenitor (supposedly *Oryza nivara)* over a broad belt extended from Ganga plains below the foothills of Himalayas, across Myanmar (Burma), northern Thailand and Laos, to northern Vietnam and south China. Annual ancestral forms of Asian cultigen of rice *(Oryza sativa)* began to appear in Neothermal Age (10,000-15,000 years BP) at the periphery of the wild annual progenitors, mainly on the southern slopes of Himalaya and, to a lesser extent, in south and south-west China. It is proposed that major explosion of annuals from their perennial ancestral origins occurred at some time during the beginning of Neothermal, as a result of abrupt changes in environment which involved a progressive increase in aridity combined for the first time with rising temperatures. Domestication could have occurred independently and concurrently in different regions, inside and bordering the vast expanse from India to south China (Chang 1976a: 143-157, 1976b: 425-441, 1985: 425-455; Whyte 1973, 1977: 209-222; Ho 1977: 413-481; Gorman, 1977: 321-355). The evolutionary sequence leading to the development of early annual forms of rice to the state of crop is very complex because of the gaps or deficiencies in evidence outside the botanical disciplines, as well as the state of fluidity that still faces the biosystematics of the wild species in the genus *Oryza*. The studies in the specialty areas have largely been discipline oriented, and do not provide an overall view. The palaeogeographers and geneticists have often taken option to conjectural reconstructions of south-east Asian pre-history to support hypothetical models of the evolutionary history of rice crop. To explain the morphological change which has become established in *Oryza sativa*, we need to know the selection pressures exerted on this crop plant throughout its history. Human selection has not always acted in the desired direction in the past, as expected on a present-day standpoint.

The rice cultivation in ancient Ganga valley has long been a subject of debate and discussion in archaeology. Regretfully, the terms "cultivated" and "domesticated" rice have often been interchangeably used in archaeological records. Ambiguity may, it focuses attention upon the plant morphology rather than man and plant relationship, with which archaeologists are concerned. Identification is solely based on readily comprehensible botanical classification, characterizing the features between the grains of morphologically cultivated and morphologically wild species of rice.

Archaeologists may also keep in mind that the grains and seeds of rice and many other plants of food value, which do not differ in any way from those of modern wild forms in our botanical classification, may have, however, been in a close relationship with pre-historic man, similar or indeed in some cases identical to consanguinity within the range of crop plants we now regard as cultivated. This standpoint has recently been elaborated in the plant economy from Senuwar (Saraswat 2004: 416-535). The terms cultivation and domestication refer to the two very different processes, with neither of them depending on the other. It is possible to cultivate non-domesticated (primordially wild) plants, while it is also conceivable to have domesticated plants without raising them in formal agricultural system. Domestication basically represents a process of genetic rather than environmental manipulation. It is not different from genetic change in nature except that the man is important selective factor for bringing out genetic change in plants. Domestication, according to Helbaek (1969: 383-426), calls for conscious effort in the way, starting from the cultivation of wild species, of selection, nursing and propagation of crop plant, creating a reciprocal dependency between plant and man. A vast literature is produced by a number of workers on the domestication of cereal crop. A summary statement on the appearance of rice cultigen in over-simplified outline is given here.

Rice grains were initially gathered and consumed by pre-historic man, in the humid tropical zones. One important event in the evolving ecosystems of Holocene happened, the considerable physiological stress on the reproductive systems of early Holocene happened, the considerable physiological stress on the reproductive systems of perennial grasses in the climax grasslands in different regions, including the broad belt from north-eastern India to south China. This abrupt change in eco-climate created conditions for the major explosion of the cereal annuals from their perennial ancestral origins (Bourreil 1972 quoted in Whyte 1973; Valentine 1970: 33-39). Peoples of primitive hunting and gathering communities, who were accustomed to hand striping the heads of perennials, got a new resource being handed to them which they found superior and more palatable and became obliged to cherish and to gather and cultivate in the face of increasing desiccation and tearing-down of the wild resources. Some anthropologists suppose that the reproductive behaviour of plants and the simple sort of cultivation became known to early man since the Palaeolithic times, for 20,000 years BP. These larger-grain annuals, in ever-increasing numbers, would have established on the bare ground between the perennial species of a climax grasslands that had become impoverished by desiccation and by overgrazing by flocks and herds of early collectors/hunters/pastoralists. The annual forms of wild rice were already adapted to the onset of seasonal droughts of the desiccating environments because of their drought-escaping character of annuality. The early collectors and pastoralists would have consciously pushed the grains in ground to protect them from marauding flocks of animals and birds; so proceeding initially to the beginning of cultivation of rice in formal way of agriculture.

Continuing and changing environmental conditions caused the primitive cultivators to move out from one region to other. They took with them their new-found source of food which they had learnt to cultivate in primitive manner — the annual forms of rice. These types of rice, already highly variable because of their origin and continued cultivation, were thus introduced into entirely new environments in which their ancestors had not grown before. Ceaseless introductions of tropically based races and strains of primitive rice, followed by variable human selections in different habitats, led to the rapid increase in the ecological diversities and also created variants, over the vast tropical and subtropical zones. This stage simultaneously involved the cutting away or uprooting of undesirable competitors around these preferred plants, and leading to them of small canals of water to extend their growth season or to increase their productivity in terms of food for humans. The creation of artificial habitats by clearing some plots near the settlements, isolated the cultivated rice from their natural habitats. This instance in over simplified manner, can be postulated that such alterations occurred in relationship to ecological changes in a broad sense; which include the environmental transformations brought about through socially and culturally different primitive human groups. This situation led to multiple domestications, for establishing rice as a staple crop in time and space. At the same time, it must also be kept in mind that search for empirical evidence is considerably complicated by the fact that both genetic and environmental manipulations are involved during the span of several millennia. In all, archaeological information is inadequate to reconstruct the process of domestication, or even to test hypotheses developed by geographers and geneticists. The vast area, from middle Ganga plain to south China is exceedingly difficult to discuss, in terms of centers, times and diffusions. The situation has been reviewed by a number of workers with a very careful statements of the degree of uncertainty. Perhaps the greatest uncertainty concerns the flux that faces the biosystematics of wild rice. The problem has further many-fold complications for want of consensus as to which taxonomically-defined wild annuals the domestications took place.

Wild Rice: Enigmatic Taxonomy in Relation to Domestication

The archaeologists normally expect the botanists to build up the model of the beginnings of agriculture in the region of Ganga plain. In fact, we lack sufficient palaeobotanical information to trace pre-historic distributions as well as sequences of morphological changes, and data are presently inadequate to bring into secure genetic relationships between wild, weedy and cultivars of rice. It is often difficult to identify wild ancestors with confidence and to reconstruct the conditions under which steps of domestication would have taken place in the past. The identification of rice remains from archaeological sites has, however, been carried out simply by the comparison of morphological features with the modern descendents of early cultivated (domesticated) and wild races of the taxon, without taking into consideration the inconsistency and complexity in the botanical classification. It is hence desirable to take up limitations of botanical approach to deal with the taxonomy of early rice remains in the archaeological records. In cereal crops, rice is particularly known for its tendency to be accompanied by weed varieties and for crossing with these weeds (Harlan 1975). Such crosses do provide a source of genetic changes and selection. A low level of cultural selection continues to occur with regard to weedy races, the grains of which are extensively consumed, but can at present not be said with certainty to be domesticated. In dealing with the changes of morphological forms of rice we, in fact, look for differences between domesticated and wild species; positively, the differences in the domesticated rice *(Oryza sativa)* from its wild annual prototypes. What, however, is the form of wild prototype? This is invariably to be established before we attempt to see differences owed possibly to domestication, and in this respect the populations of wild and weedy races of rice cultivars have not as yet been analysed with any success. The so-called modern prototypes are not the original prototypes, but feral domesticates. The presumed modern wild distribution reflects the spread of feral domesticates or of hybrids between these and wild forms. In the opinion of Robert Orr Whyte (1973) the evolution of annuals throughout the limits of many perennial species of *Oryza* happened at the same time, producing the polyphyletic origin of cultivated rice (cultigen) and its many annual relatives which are incorrectly called "wild rice". *Oryza nivara* is generally accepted as the annual wild progenitor of *Oryza sativa.* However, rice has remained for millennia with and between several recognizable species so widely distributed, that several different species in the past may have contributed to *Oryza sativa* (Gorman 1977: 321-355). In this context, the two ancestral species of *Oryza sativa* are essentially conceptual taxa of the remote past. *Oryza rufipogon* as perennial and largely asexually propagated, while *Oryza nivara* as annual and essentially seed propagated. *Oryza nivara*, standing for being the wild annual progenitor, follows taxonomical matter of form in description and naming. Nevertheless, the true specimens of these two perennial and annual species, which contributed to the evolution of rice crop, are not available now because of the continuous and meddlesome hybridizations among the wild, weedy and cultivated races (Chang 1976b: 425-441; Sharma and Shastry 1965: 157-167). Weed races collected at present have indicated that gene-flow has largely been from the cultivated rice to wild forms (Sampath and Govindaswami 1958: 7-20; Oka and Chang 1959: 105-117). Several strains designated as wild *Oryza* *perennis* or O. *rufipogon* that contained annual forms, are reported to have received some distinct features contributed by the cultivars of *Oryza sativa* (Chang 1976b: 425-441).

Robert Orr Whyte (1973) suggested the field-collectors of truly "wild" or "primitive cultivated forms" of cereals "to give attention also to those annual types which are likely to occur in or near extensive climax stands of their perennial ancestors, where these can still exist. These annuals may be of recent origin, of a less evolved and restricted genetical composition, having wider spectrum of variability than their modern counterparts in the secondary or tertiary centers. Collection of seeds may also be profitably made from the ancestral perennials themselves, on the fringes of their natural distribution, where physiological stress may induce the appearance of off-types tending towards annuality". Unfortunately due to a large-scale agricultural expansion and under changed climatic conditions, no extensive climax stands of perennial *Oryza rufipogon* occur now-a-days over the region of middle Ganga plain or even elsewhere in north- eastern India. Weedy races have enlarged their ranges, non-weedy early species have seriously been reduced or have become extinct or nearly so. There have been multiple cases of domestication over a wide region in time and space. Some domestics, easily revert to a wild or weedy status (Harlan 1976: 13-25). In view of this, the status of annual forms of *Oryza Sativa* rufipogon growing as a weed in rice-crop fields of south Asia may be viewed. This so-called wild rice, correctly weed, freely intercrosses with rice cultigen. In words of Riley (1976: 209-213) – "We must not forget that plant spec that we now call 'weeds' often formed part of the heterogeneous product of agriculture in the past".

Furthermore, the renowned rice-geneticist T.T. Chang (Chang 1985: 425-455) reinforced that the "typical specimens of the wild relatives are no longer available in nature as a result of hybridization and introgression with the cultigen and the annual weed race *(Oryza sativa f. spontanea)*". The weeds of crop fields, however, tend to have larger seeds than their congeners (Salisbury 1974: 83-88) and may undergo selection for seed-size and shape, in parallel with for the crop itself (Evans 1976: 71-83). *Oryza rufipogon* in Asia, has both annual and perennial forms, which intercross freely with one another and with cultivated races as well. Collection of wild or spontaneous annuals often segregate for cultivated characters. The cultivated characteristics are often transferred to spontaneous races by natural means. The situation is genetically so messy and the interactions are so extensive that nature of the original wild race is difficult to untangle (Harlan 1977: 357-383).

The issue has not been resolved precisely on the basis of either archaeological or botanical evidence alone, to reconstruct the model of domestication of rice on the empirical grounds.

Husbandry Practice Intrinsic to Domestication

Evidence of the early stages of plant manipulation in post-glacial times is understandably very vague. What sort of documentation in archaeology could be surmised? We find grindstones during 15,000 - 10,000 years BP. Sickle blades are found with a sheen, which is supposed to be produced in the course of cutting of reeds and grass stems. These generalized stone tools could be used for many purposes by non-agricultural communities. Plant remains elude us at this time range. Nothing is very conclusive. Food procurement is regarded to have been focused on harvesting the grains and seeds of wild grasses and other herbaceous plants. This system would have functioned as the beginning of pathway to agriculture in some of the areas where it was practiced, but certainly not all over.

It is proposed that the earliest farmers did sow and harvested wild grasses, they failed to domesticate them for a long time, in the sense of establishing a morphologically differentiated reproducing population. This failure would have been attributable to the harvesting methods brought in to practice. Consequently, sowing and harvesting of wild rice and other grasses could have continued indefinitely without forming domesticated forms with non-shattering grains. For how long, we do not know. It seems logical to think that these were the techniques of harvesting which were deterrent to domestication. There would have been some other method of harvesting, giving accidental impetus to the process of domestication.

There are five harvesting methods with which early cereal cultivators were, in all probability, familiar. Beating the ripe spikelets applied in a single or in multiple passes; use of sickles or other cutting equipments - for near-ripe or unripe crops; uprooting of plants with near-ripe or unripe grains; plucking or hand-striping; and burning. The feasibility of each of these methods is attested by ethnographic studies of recent wild grass-seed foragers, including hunter-gatherers and farmers who supplement their domestic yield. Field experiments and observations of a number of scientists (Wilke *et al.* 1972: 203-209; Harlan 1989: 79-98), and by experiments at archaeo-agricultural research centers (Reynolds 1981: 97-122; Anderson-Gerfaud 1988: 175-195), suggest that when exposed to these different methods, the wild type of crops would be domesticated only if harvested by sickle-reaping or uprooting, while the grains are partially ripe or near-ripe (Hillman and Davies 1990: 157-222).

Mutants toward non-shattering population would have occurred in large populations of wild rice at an much early dates in the region, in the grain stocks of some settlements where the sickle-reaping or uprooting were practised. The continued exploitation of rice progenies by a sickle or uprooting (or combined), followed by reseeding, would have culminated in the appearance of the fully fledged domesticates.

On the Trail of Rice Cultivation during Early Holocene Times in the Middle Ganga Plain

We have more or less universal and ample evidence of rice remains from a large number of pre-historic and proto-historic settlements widely scattered in the region. There has been a rash of dates of these finds, in different cultural contexts, from about 2000 BC to the Early Historical times. By and large, domesticated and wildly growing forms of rice have securely been identified in the archaeological sites. One may infer a long interplay between the man and wild forms of rice and other grasses from the early Holocene times, which must have led to the domestication and culmination of fully developed domesticated forms in the agricultural practices at expectedly much earlier dates in the pre-history. But, we were faced in the Ganga valley with a curious paradox, in the lateness of evidence of domesticated rice in its own cradle. Details of all the sites revealing the information of growing rice as a staple crop are not required to be elaborated here. It appears that considerable archaeological explorations and excavations in the past were not seriously looked for the search of early evidence of rice.

One cannot brush aside the contributions made by the Allahabad University Department of Archaeology, in establishing the primacy of early Neolithic beginning in the Belan valley and Vindhyan plateau regions, in the archaeological context of the sub-continent. The sweeping evidence through the extensive excavations at Chopani Mando, Koldihwa and Mahagara revolutionized the understanding in the sequences of transition from the stage of food gathering and selective hunting (in Epi-Palaeolithic Period) through incipient food-producing (proto-Neolithic) to settled village farming in the Neolithic times (Sharma *et al*. 1980; Sharma 1980; Sharma 1985: 369-371). Within the chronological framework provided by calibrated ranges of radiocarbon dates (PRL-100: 6375 - 5645 BC and PRL-101: 5410 - 5010 BC, in Possehl and Rissman 1992: 465-474), the evidence of Neolithic culture at Koldihwa and Mahagara was regarded to date back during 7th-6th millennia BC. Pottery from Koldihwa and Mahagara was reported to contain copious impressions of cultivated rice *(Oryza sativa)*, along with those of annual and perennial forms of wild rice, viz. *Oryza nivara* and *Oryza rufipogon*. Also the grains of *Oryza sativa* were recovered from Neolithic Mahagara (Savithri 1976; Sharma *et al*. 1980; Sharma 1985: 369-371; A. Sharma 1983). Rice was also used in this region even in the advanced Mesolithic or proto-Neolithic cultural phase (BS-130: 11,550 ± 180 BP cal. date 9945 BC and BS-131: 9830 ± 160 BP - cal. date 8175 BC), as evident from Mahagara. But it was of a wild variety. The evidence from these sites showed a long term continuity of the gradually led to the resource husbandry in the Neolithic times, during 7th-6th millennia BC. This awe-inspiring archaeological work sprouted in the form of a model of "Beginnings of Agriculture" (Sharma *et al*. 1980).

For quite some time waters have muddled about the early beginnings of Neolithic culture in Belan valley and consequentially the early evidence of rice in the middle Ganga plain during 7th-6th millennia BC came under question, when some scholastic workers, notably Pal (1986) and Possehl and Rissman (1992), reasoned to place the Neolithic culture within second millennium BC. The discrepancy remained in determining the levels of Neolithic phase at Koldihwa and provenance of charcoal samples taken for dating, and in determining the exact boundaries between the levels of Neolithic and subsequent strata of Chalcolithic culture. Possehl and Rissman have made a critical analysis of material culture of Mahagara and Koldihwa and judiciously conceived the similarities of these sites with the Kunjhun-II and Kunjhun River Face in the Son valley, in their pottery and other cultural artifacts. Corroborating their observations in the light of a number of radiocarbon dates, they have contemplated to place the Vindhyan Neolithic culture in Belan valley within the general time-bracket of 4000 - 1200 BC. There are four radiocarbon dates from Neolithic Mahagara (BS-128: 3330 ± 100 BP - cal. BC 1770 - 1545; PRL-407: 3300 ± 100 BP - cal. BC 1745 - 1520; PRL-409: 3260 ± 150 BP - cal. BC 1745 - 1390; PRL-408: 3190 ± 110 BP - cal. BC 1670 - 1375). In view of these dates, Neolithic culture at this site falls between the calibrated ranges from 1770 - 1545 to 1670 - 1375 BC (Possehl and Rissman 1992).

The evidence of barley from the same Neolithic stratum at Mahagara (Dixit 1987: 125-127), from which the evidence of domesticated rice *(Oryza sativa)* was recorded to establish the rice-based agriculture during 7th-6th millennia BC, brought the authenticity of early evidence under question (Saraswat 1992: 514-545; Saraswat 2004: 47). Barley, which is a staple crop of Harappans in north-western India, would certainly have not arrived in the middle Ganga plain before the Harappan times. Earliest claimed find of domesticated rice had been quoted over by a number of archaeologists in India and abroad for a considerable time, in the context of early Holocene agriculture in middle Ganga plain. Regrettably, the chronological determinations, and the propositions for pushing back the cultural sequences of farming community in early Holocene got cluttered in controversy and uncertainty.

Taken together the material forms of distinctive cultural assemblages that is called Vindhyan Neolithic, the archaeology craves for the reassessment of the situation in India through fresh excavations. After all, where from the early charcoal came at Neolithic-Chalcolithic interface at Koldihwa? More crucial, perhaps, than dating the charcoal, is the determination of correct provenance, *i.e.*, the source of its origin through some early human activity. Circumstances of disturbances in the chronological sequence of sites, are commonplace and remain imperceptible in excavations. Tewari *et al.* (2000: 69-98; Tewari *et al.* 2003: 37-68) have generated a gross discussion on the estimation of cultural materials and the available dates, which unwaveringly incline still to hold the view that the early dates proposed by Sharma *et al.* (1980) appear logical. We need a quest to untangle the problems of chronology that beset the investigators to pinpoint the sequence of events that led from a period of broad-spectrum hunting/gathering toward and into early agriculture in the Belan valley. Stories do get changed. In this way many workers may manage to convince themselves or others whether valid evidence for early Holocene agriculture existed or did not. Only the fresh excavations can resolve the quandary; and what we need are sequences of dates in different strata all agreeing as to the chronological sequences and all thus supporting the same set of suppositions, regarding early Holocene sequence of Neolithic in the Belan valley.

We now turn to a small site at Malhar in Chandauli district in south-eastern Uttar Pradesh, situated on a ridge overlooking the river Karmanasa in the Vindhyan plateau region. Excavated recently in 1998-99 by the Uttar Pradesh State Department of Archaeology, Lucknow, the settlement revealed four cultural periods. The formative pre-Iron Phase (Period-I), originated around 1900 BC (BS-1590: 1900 ± 180 BC, cal. 2283 (2143) 1984 BC). Ceramic industries, shapes in pottery and other artifacts from this non-metallic phase are comparable to those from a number of Neolithic sites in the region, including Koldihwa and Mahagara in Belan valley and Kunjhun in Son valley. There is no hiatus between the Period-I and the successive Period-II, characterized by the presence of iron. Upper limit of Period-I interminable to the commencement of Period-II, is datable to about 1700/1600 BC (BS-1593: 1700 ± 90 BC, cal. 2012 (1882, 1836, 1834) 1742 BC; BS-1623: 1600 ± 90 BC, cal. 1882 (1743) 1639 BC). Periods III and IV, in want of radiocarbon dates, are placed in the time-brackets of 700 - 300 BC and 200 BC - 300 AD respectively on the grounds of ceramic industries and other cultural artifacts, as already established in the region (Tewari *et al.* 2004). From the ancient agricultural point of view the Periods I and II are more important and analysis of botanical remains have relevantly established that the inhabitants at Malhar belonged to a progressive farming community (Saraswat 2004: 137-171).

Here also, as in the chronology of Neolithic Koldihwa, an astounding problem came up to be coped with when some disguised human activity camouflaged contamination of much earlier charcoal content in a pit concealed by a layer of Iron Age habitational deposit. During the course of examining the samples of carbonized remains from different depths in this refuse pit, a sudden decrease in the density of organic remains at a particular upper level, enticed the attention of the author of this article. In this pit sealed by layer 3 of Iron Age phase, in trench A1 organic material was collected by water floatation in a rich density at the depth of 1.00-0.90 m. It was comprised of quite large fragments of wood charcoals in association of grains and seeds in a good number. Above this level at the depth of 0.66-0.63 m, the sample although became downsized, but it revealed quite a rich assemblage of grains and seeds. What was amazingly apparent at the depth of 0.63-0.61 m that the charcoal abruptly minimized in quantity. It was in the form of very small bits, containing only a very meager remains of rice and foxtail-grass grains in highly fragile and deteriorated condition. The mud at this level in the pit became untethered and lightweight. Entire mud in the pit at these varied depths, was subjected to water floatation, to retrieve all the possible remains of organic material. Heterogeneity of organic remains in the deposition at this level was reflecting on probability of some human activity in the sealing layer 3. From the stratified deposit of the layer 3 in another Trench XA1 a sample was subjected for radiocarbon date determination to suggest the upper age limit of Period-I (BS-1623). For the cross-check, the sample also selected in this pit at the depth 1.00-0.90 m to determine the date (BS-1593). The density of grains and charcoal remains in the pit under investigation increased downwards. The crucial and investigative observations made by Helbaek (1952: 97-107) signaled me to suspect the riddance of a heap of refuse in the upper part of this pit. What bothered me and the excavators most was that the carbon content in the pit from the lower level at the depth 1.00-0.90 m (BS-1593) gave the reasonable estimate of the age about 1700 BC, while the sample 24 cm above at the depth of 0.63-0.61 m revealed the date around 4620 BC (BS-1614: 4620 ± 110 BC, cal. 5475 (5358, 5351, 5340, 5329, 5323) 5262 BC), the date about 3000 year earlier to the beginning phase of the Iron Age occupation at the site. The circumstances indicate that the mud containing the remnants of charcoal and the grains of rice and foxtail-grass would have happened to be trodden from some unrecorded locale of much earlier human activity and reflected the riddance in the pit. The single early date from the deposit in the Iron Age pit merely suggests some place near the settlement in the past time to which the range of some early human activity is expected to lie. Some earlier deposit containing the refuse of organic material, obviously, would have been in the close catchment area and randomly dumped in the pit by the settlers, during the Iron Age. This is the only possibility of disturbance, which would have moved earlier mud with organic refuse into the much late habitation, to have given such an early date. As a matter of fact, the early evidence of rice *(Oryza sativa)* associated in the organic refuse in the mud (dated to 4620 ± 110 BC) is reported to be coincidental and indirect at Malhar. Seen through the glass of such a model of indirect evidence, the probability of some early farming culture and the rice cultivation somewhere in the region seemed quite high and indisputable.

Unknown scatters of charcoal appear to have occurred in a number of archaeological sites. In not a few cases of apparent discrepancies in radiocarbon dates, regarded as 'erratic' by a number of workers, the plausible explanations by the excavators have been overlooked. Sharma *et al.* (1980) occasionally quoted a date, PRL-224 adjusted to 7080 - 6080 BC as a Neolithic date, but the stratigraphic association of this sample remained uncertain since it was originally published as coming from an Iron Age pit (Agarwal *et al.* 1977: 229-236). The remains of rice and crop plants, in association of such dispelled charcoal contents may, however, indicate early antiquity of agriculture.

As an outcome the long standing hope that the early innovations associated with food production and the consequent changes in the ceramic styles and economy at an early date, ultimately received a considerable measure of support from the still ongoing excavations at Lahuradewa, an early lake-side Neolithic settlement of architecturally well expressed village-farming community in district Sant Kabir Nagar (U.P.). Excavated by the U.P. State Archaeology Department, this archaeological site in the middle Ganga plain is validated by internal agreement in a number of radiocarbon date determinations, to suggest a yawning stretch of Neolithic culture spanning for several thousand of years from far back in early Holocene up to about 2000 BC, and further succeeded by a Chalcolithic and the confined phases of cultures in Early Historical times (for details see Tewari *et al.* 2005: 39-49). A preliminary contemplation of the emerging plant economy at this site has recently been amassed (Saraswat and Pokharia 2004: 46-47). Here, I have tended to confine myself to the earliest and first claimed authentic evidence of domesticated rice from the middle Ganga plain in India.

In the very opening of Neolithic phase at Lahuradewa the presence of domesticated rice *(Oryza sativa)* has been recorded in the two deepest layers of two different trenches, in the assortment of the remains of wild or weedy form of rice *(Oryza* cf. *rufipogon)* and broken pieces of the foxtail millet *(Setaria sp.)*. The powdery charcoal associated with these remains in the bottom layers of both the trenches dates to 6th-5th millennia BC (BS-1951: 5320 ± 90 BP, cal. 4320-3997 BC; BS-1967: 6290 ± 140 BP, cal. 5464 - 5059 BC). Considerably startling has been the AMS radiocarbon determination of husk-piece of domesticated rice (carried out at Physikalisches Institut der Universitat Erlangen, Nurnberg, Germany), irrefutably propelling the age to 7532 ± 58 year BP, cal. 8259 year BP or 6409 BC. The domesticated form could only be differentiated when it became morphologically distinct from wild, during the course of human manipulation. This would prima facie constitute the reasonable background to surmise that the domestication and cultivation in the Ganga plains was already in practice during still earlier post-Glacial times. The time range of the antecedent activities, leading to the morphologically distinct form of *Oryza sativa*, is not easy to assess at present. Indeed any movement of the evidence of identifiable *Oryza sativa* backward in time will increase the suggestion of progressively early agriculture in the regions of Ganga plain. The picture will certainly change in future course of studies.

This heart searching belongs to the archaeology of middle Ganga plain now, but this is reasonable in the time. A wide blank - a yawning time of several thousand of years - has spread for the cord impressed tradition of Neolithic at Lahuradewa, from about 6400 BC to 2000 BC. This, indeed, is for the first time which archaeologists are expected to appreciate: that a coherent pattern of radiocarbon dates of Lahuradewa promises to be of real value, as compared to one or two dates from other sites. A pattern of dates (Tewari *et al*. 2005: 39-49), on the other hand, such as is beginning to emerge for early farming culture in the Ganga plain, cannot lightly be disregarded. Further, a coherent sequence of vegetational changes is built up by botanists since 9500 year BP, based on the pollen analysis from the adjacent lake-beds at Lahuradewa settlement, and the evidence of cerealia pollen from the level dated to about 6700 year BP dispels all the doubts for the early agriculture (Chauhan *et al*. 2004: 41). When Mesolithic way of life is seen during early Holocene times, there were already farmers in the several regions of middle Ganga plain. Now that we have seen the evidence of the domesticated form of rice and got the datings of the material itself and of the associated charcoal content in the opening phase of Neolithic, insofar as possible, let us consider the long-awaited problem of the light shed upon the early agriculture in the middle Ganga plain, during early post-Glacial times.

Equally important is the cultivation of rice during third millennium BC in the wheat and barley growing zone of Harappan Civilization in the regions of Haryana and Punjab. It may only have been possible when its potential as a cultigen, outside the natural habitats in Ganga plains receiving much higher rainfall, would have been realized at much early dates. Occurrence of rice remains from the phases of Early and Mature Harappan cultures at Kunal and Banawali in district Hissar and Balu in district Kaithal, dated from about 3000 BC to 2000 BC, are worthwhile in this context (Saraswat and Pokharia 2002: 153-171, 2003: 105-139; Saraswat 1995: 116). Profuse husk impressions in mud clods and pot-sherds at Kunal and Balu, which could be incidental or the result of tempering, give a broad indication that rice would have established as a staple crop at these settlements and, in all likelihood, in the surrounding regions as a whole. Quite appreciably the glimpses of rice cultivation during Early Holocene times have come from China. Origin of pottery in China as back as to the Last Glacial Maximum (23,000 - 21,600 cal. year BP) and the evidence of rice cultivation to the Neothermal Age (15,000 - 10,000 year BP), have been recounted by Yasuda (2002: 151-156). Rice cultivation at Xianrendong in Jiangxi Province is reported to have gone as back as between 14,000 year BP (cal. 15,322 - 14,392 BC) and 11,000 year BP (cal. 11,209 - 10,925 BC). Another evidence comes from Yuchanyan in Hunan Province, dated to 12,060 ± 120 year BP (cal. 13,364 - 11,869 BC). It has been regarded that deposits in the Yuchanyan cave are typical for south China, during early Holocene times.

In the words of Reed (1977: 881-953) - "any controversies based on regional patriotism as to whether this area in eastern Asia was 'first' with this or that innovation in the early history of agriculture can only be based on the happenstances of archaeological discovery, to be reversed perhaps with the next discovery". Some regard India as an ancestral home of rice, while others are in favour of China. The rational viewpoint of Chang (1976b: 425-441) that "cultivation in south-eastern Asia could have occurred independently and concurrently" within a broad belt from India to China, is duly acknowledged. In adopting the environmental interpretation, it becomes unnecessary to evaluate rival claims (Whyte 1973). I feel the archaeological and historical models of agricultural evolution in time and space, do not define boundary conditions in a broad zone of tropical south or south-east Asia, for a lesser or more successful human interaction with environment, during the remote past. Early discoveries of rice growing cultures in China have come out because of comprehensive and objective oriented research strategies, in relation to a complex scenario of environmental changes in Holocene times. Whatever the progress in the Ganga plains, is due to the efforts of a few individuals. We need more evidence of early farming communities in the middle Ganga plain. Many more dates to 5th-6th millennia BC or even earlier would be found in this cradle of early agriculture, I am certain. There are vast areas in Bihar, Orissa, West Bengal, Assam and Arunachal Pradesh, from where it is too little to be considered in the early Holocene context or no information is available. This is serious gap in our knowledge about early Holocene man, which can of course be filled up in the course of time when promising sites with plant remains are discovered and excavated. However, beyond question the areas in eastern India are bound to drastically change the present scenario.

It will not be out of place here to realize that the "agriculture" itself is often reserved for highly intensive form of environmental management. The theoretical model of the "Beginnings of Agriculture" need not occupy much of our thoughts. One is required to consider a very long sequence of stages in parallel evolution with the environment and changing conditions of desiccation, making available annual grains which the early gatherers liked and started to cultivate. Initial domestication of wild forms up to the stage of distinctly identifiable domesticated rice (*Oryza sativa*) obscures gradation, in the archaeological remains. Advent of sedentary communities is proposed to have taken place long after the occurrences of domesticated plants (Higgs and Jarman 1969: 31-41). In fact we know almost nothing about the changes in human behaviour between those levels in which there is no difference in the grain forms, and those in which differences came up to regard the rice as a domesticated form. Agriculture, indeed, developed incrementally out of hunting and gathering, and in concert with increase in the intensity of environmental manipulations. With such a proposition, it is not equitable to erect a model for the beginning. Significant question is not when agriculture developed and in which region, but rather why humans in various places and various times felt in need to increase time and efforts in wrestling with their environment to coax it to produce greater amount of food. If we approach this question within the framework of ecology, the greater reliance would have to be placed in quaternary environmental determinism, rather than in archaeological excavations.

Estimating the Identification of Early Rice Remains

Carbonized rice remains with and more frequently without husk and copious impressions of husk in pottery and burnt mud-clods, familiarly found buried in archaeological deposits, provide the evidence of rice cultivation. Rachis remains are also found, but uncommonly. The range and variety of modifications in all these remains achieved under the impulse of domestication offer faithful criteria to determine the identity of the domesticated rice *(Oryza sativa)* and segregation from the counterparts of weedy and other forms of rice in natural stands. The primary and basic qualification of evidence in these macro-remains of fertile organs of rice, is based on the ground of disruptive selection by early cultivators and farmers for millennia, which produced cytogenetic change for these desirable features. Ever since, human selection favoured larger spikelets and tough rachis and these characters along with other distinct features in the morphology of spike lets are still maintained, despite the very frequent hybridizations between the crop plants and the weedy and other naturally growing stands of rice plants which we informally call wild. If the cereals were originally cultivated and domesticated for fodder, human selection would have not been directed at the grain characters. Some crop experts opine to the extent that the evolution of crop plants has been primarily the evolution of organs used by man.

Inclusion of the remains of leaf, stem and other vegetative parts of rice in the mud clods and pottery generally implied to suggest the agriculture, posit the problems in differentiating the domesticated form of rice from weedy races on the botanical grounds. On the sites where macro-remains are not preserved the identification of plant bodies composed of opaline silica (phytoliths) may be an advantageous source in future to trace rice remains during early Holocene in India. Elsewhere, this approach has emerged considerably to have identified the phytoliths of wheat, barley, maize, legumes, rice and also of some weeds, to suggest the models of crop processing on archaeological sites. Along with macro-remains, phytolith studies have assisted in good interpretations of agricultural practices in the past. Although final judgment on phytolith analysis in archaeology cannot yet be made, the results of much research carried out is considerably stimulating. Advancing information in determining the secure presence of rice at generic level has come up and some have attempted the identification up to specific level. In view of complex taxonomy of rice species, considerable insurance is vouched for. The quality of evidence is so low and precarious that there may be little to choose between the alternative interpretations whether the plant was wild, or it was spontanea, or hybrid form, or it was an escape from cultivation. Problem is compounded further because phytolith production differs in different parts of plant. Paucity of keys and published regional studies make applying phytolith taxonomy difficult for a beginner and only a highly experienced person in rice phytoliths is expected to place his finger in the much intriguing problem that calls for constructive exposition, who has thoroughly researched and documented job. Idealistic assertions for the potential of this approach are damaging. Even more harmful would be unjustifiable feelings and unwillingness to let this discipline find its role for the search of rice in the early Holocene archaeology in the Ganga plain. At present the scope of the identification of domestic form of rice and its differentiation from the wild forms, on the ground of the comparison of spikelet remains, is the only established approach in archaeology.

Ecological Introspection of Agriculture Practices

Under primitive conditions viability of agricultural communities would have depended directly on the knowledge of the habits and habitats of crop complexes, life cycle and ecological requirements of available food plants, on the technical means available for exploiting the landscapes, on the social mechanism involved in the quest for stable food supply, and not the least on the ideology that ensured coherence of society to exploit land resources around the settlements. The idea of certain kind of cultural complexity being necessary prerequisite for the change and emergence of a particular type of agriculture, even in the simple Neolithic community in a particular zone, does not seem illogical in the light of crop remains recovered in the middle Ganga plain. The practice of agriculture represents an imposed change of the ecosystems, which vary in their stability, and such influences, by altering the components of microclimate and vegetation. The range of crops grown, particularly from the middle of 3rd millennium BC up to the beginning phase of Christian Era, seems to have entailed the gradually expanding creation of an artificial, that of man-made environment. It is difficult to assess the ecology of the cultivation of crops in archaeological vantage point in any specific, but generally convincing, way.

There are two major cultivation systems represented in the region, involving the use of wet and dry fields. Although there is no empirical proof at the time, ecological considerations indicate that the systems would have independently occurred in the region. Raising the rice in this region was definitely in the wet field cultivation system, likely originated in humid tropics. Far more likely, there were shallow depressions and water holes in the middle Ganga plain, that fill during the rains and dry out in summers. Whether rice was first cultivated in such habitats in the uplands or in the lowlands, remains uncertain. Two methods of wet rice cultivation have been practised in the Mainland south-eastern Asia: one depending on the natural flooding of undiked land and the other on diking or irrigation. The former which is regarded primitive, is associated with broadcasting of rice seeds (grains) sowing onto field still dry. The latter system is associated with the transplanting of seedlings to the fields already flooded. Techniques of harvesting also vary from the hand plucking of individual seed heads to the use of harvesting knives, which is commonly employed in India and China where the rice is raised as a staple crop (Hanks 1972; Harris 1977: 179-243). Early farmers, in all likelihood, broadcasted rice grains and did not transplant the seedlings, caring nothing about manuring, deep ploughing and weeding. The habitat could be exploited with a minimum of equipment and labour investment, during early Holocene and even in the following Neolithic and Chalcolithic times. Transplanting system, to raise pure stands of crop would certainly have been later. Wetfield systems were able to maintain fertility over a very long periods. Inundated or swampy fields generally derive nutrients and organic materials that are dissolved and suspended in water.

The emerging evidence of job's tear *(Coix lachryma jobi)* and foxtail millet *(Setaria* sp. - comparable to *Setaria glauca)* in the samples of carbonized rice from Neolithic periods at Senuwar and Imlidih Khurd, suggest the raising of rice in mixed life-form assemblages. Field crops associated with rice vary from small-seeded millets to large-seeded job's tear, are characteristic of rainfed swidden systems in south-eastern Asian countries. There is evidently scope for an alternative approach in which pre-historic economies in middle Ganga plain may be given some due consideration (Saraswat 2004: 137-171).

We should also keep in mind that many other plants, the seeds of which do not differ in any way from those of wild forms in our present classification, may have, however, been in close relationship with pre-historic man, similar or indeed in some cases identical to consanguinity within the range of crop plants we now regard as cultivated. In archaeological records, they are contemplated as wild and gathered ones. The grains of wild grasses belonging to foxtail grass *(Setaria glauca)* and job's tear *(Coix lachrymajobi)* come in this category. Seeds of these grasses have been gathered and eaten by the tribals in Bihar and Orissa (Haines 1925). The areas in the middle Ganga plain support sizable stands of these wild grasses. These can give very respectable yield of food, and in some circumstances may be more dependable than cultivated crops (Harlan 1989: 79-98). Neolithic farmers in the region in all appreciation for wild-grass grains, certainly would have not overlooked such a rich source of nutritious plant food, an especially one so easily harvested and stored for future use. Remains of foxtail grass and job's tear are normally included in the category of weeds and wild taxa, their discussion is relevant in the subsistence economy. They are either boiled or eaten whole or more rarely ground to flour. Foxtail grass *(Setaria* cf.

glauca) is reported to have been cultivated also as *kharif* crop on uplands or in hilly regions. The crop does not need either irrigation or manure (Haines 1925, Anonymous 1972). This aspect is generalized and observations on the ecological conditions tend to confirm a theoretical pattern. The opulent evidence of the grains of foxtail-grass from a number of sites in middle Ganga plain has provided us a record of pathways from the gathering to farming stage in much earlier times. Gathering has persisted commonly till now, because it has less hard work than farming. If it is a model of incipience, we would do well to study and interpret the evidence and then behold if it is helpful in detecting such a system in archaeological record. However, these kinds of inferences do not leave traces in the archaeological lexicon. Cultivational *Setaria glauca* as documented about 75 years ago by Haines (Haines 1925), by the tribals in Ranchi in Bihar, gives an impression that along with gathering the cultivation of this grass must have been practised since much ancient times and for the reason of being less efficient cereal, its cultivation has gradually been dropped and replaced by those crops that yield more for a given investment in labour.

Job's tear *(Coix lachryma-jobi)*, native to south-east Asia, is common throughout middle Ganga plain. It is common along water courses, ditches, etc. This wild grass with its hard and smooth shelled fruits, is also cultivated in many parts of tropics, particularly among the hill tribes. The grains of wild as well as cultivated types are used as food. Job's tear was at one time a fairly important cereal of the wet tropics in south-eastern Asia. It has been reported to be still cultivated as a cereal in the Philippines and New Guinea and by the hill tribes of Vietnam, Cambodia and Laos. Its cultivation spread to areas where rice culture was not yet penetrated. Job's tear has been thought to be older domesticate than rice and at present it is rather a minor cereal, having been replaced to a large extent by rice cultivation (Harlan 1977: 357-383). Not only the *Setaria glauca* and *Coix lachryma-jobi*, there were probably other minor cereals also which were more Important to human nutrition. In all likelihood, these were widely grown than they are now, and later abandoned (Harlan 1977: 357-383). This fact seeks considerable sustenance from the observations of wild plant collection and manipulation by modern tribal communities and also the "unconventional" cultivation of the same species. A range of such types of minor cereals and millets, in addition to *Setaria glauca* and *Coix lachryma-jobi*, includes *Dactyloctenlurn aegyptium*, *Digitaria cruciata*, *Digitaria cruciata* var. *esculenta*, *Digitaria sanguinalis*, *Echinochloa colana*, *Echinochloa crus-galli*, *Echinochloa frumentacea*, *Panicum miliaceum*, *Panicum sumatrense*, *Paspalum scrobiculatum*, *Urochloa panicoides*, etc. (Harlan 1975; Vishnu-Mittre 1978: 21-36; Mehra and Arora 1978). In all appreciation to a meaningful discussion and citing the examples of such plants which are not cultivated taxonomically speaking, it may be possible to opine that comparable events took place with the species of wild plants which favour the eventuality of an early spectrum of incipient agriculture in pre-historic times in which the minor cereals of *Setaria glauca*, *Coix lachryma-jobi* and several others were taken to cultivation. It is conceivable to cultivate non-domesticated or wild plants. The wild plants remains wild even when they are grown under the improved condition of cultivation, showing better development and higher yield than those plants gathered in the natural fields and forests. They still have not lost any characteristics that make them more useful or desirable than wild plants, and also do not differ in any way from the point of view of botanical classification. The distinction between the wild species and its cultivated descendents lies where the morphology of the latter is sufficiently definite to allow practical separation of both. It is not necessarily the botanical classification to differentiate between the gathering and agricultural systems in pre-historic economies. One cannot safely take it granted that some cereals comparable to wild forms in the archaeological records, were not actually cultivated in the past. The difficulties involved in interpreting archaeological samples of the grains of *Setaria glauca* and *Coix lachryma-jobi* must now be apparent. Their cultivation also may, therefore, not be ruled out, during early times in middle Ganga plain. It is difficult to work out the system and technology of agricultural operation, merely on the basis of carbonized crop remains. But, the placing of *Setaria* and *Coix lachryma-jobi* in association of rice, seems to imply much for the evidence of their mixed cultivation with the main rice crop in the marshy habitats.

It seems reasonable that the region of middle Ganga plain for the most part was a culturally passive zone and that its cultural and technological achievements pertaining to the agricultural economy, shared the influences from the eastern side, being a part of broad belt of rice domestication stretching up to south China. Significant advances in the Neolithic agriculture appear by the influences from north-western regions of the sub-continent, during third millennium BC. Seemingly the argument becomes environmentally deterministic: the environment of rice growing middle Ganga plain would have been a factor in the introduction of west Asian cereals and pulses, and also for the drought resistant African millets, such as *ragi*, *jowar* and *bajra*. I think, the primary decision for the introduction of this crop complex of north-western region with altogether diverse ecological and agronomic requirements, was cultural. The inclusion of this agricultural system in the rice growing areas certainly took place in the habitats around the settlements maintained through the human manipulation. Did the physical environment influence the decision making of early Neolithic and Chalcolithic farming communities to opt for the agricultural pattern of north-western India? Certainly not. Shift to the new crops, not suitable in the environment of rice growing zone, definitely suggest that the environment inhabited by man was prone to culturally guided transformations.

It is difficult to trace interaction with the ecosystem in the region, in the form of habitat modification to suit the discrete agriculture system. Rich data on the crop remains amply demonstrate that despite the metal technology, Neolithic farmers could successfully exploit the land resources for effective means of agriculture. Only by creation of artificial habitats, it would have been possible for them to raise the crops of various types, just on the same pattern followed by contemporaneous or later Chalcolithic communities. It is generally regarded that the metal technology was by far the most important factor which heralded new change in the cultural advancement, and accelerated the clearance of vegetation to obtain tracts for settlement and agriculture. But the factual evidence of varied types of crop remains from Neolithic sites does not support this issue. Farming was successfully operated prior to the introduction of metal technology. Very fundamental ways of manipulating the environment would have involved attempts to regulate the water supply by draining water, by retaining it through bunds. Conversely, artificial drainage could have permitted the transformation of swampy environment into dry land habitats. In other words, canalization could have made it possible to establish in the seasonal tropics, the habitats that are typical of humid tropics and also vice versa. These options must have entailed some labour investment in the engineering of more or less permanent modifications of the landscapes around ancient settlements. Through this sort of creation settlers raised the crops of wheat and barley cereals, pulses and even drought resistant millets of jowar and ragi in their natural environment suitable for rice cultivation. In any event, it must be kept in mind that the archaeology does not, at present have such a body of data. This presumption of habitat modification in middle Ganga plain was presented by me, while describing agricultural remains from Senuwar in Bihar. Generalization is made here for other early Neolithic settlements also in the region. The cultivation in wet-fields and dry-fields does not show a sequence in agricultural developments. It simply indicates two separate developments under different ecological conditions. The idea was originally triggered by Bartlett (1962: 270-273). He felt to propose opposite ecological rationale that the cultivation in the flooded fields originated in seasonally dry environments, while dry-field cultivation originated in humid tropics. In many parts of SE Asia whet environmental conditions make the maintenance of wet-fields costly, dry-field in permanent plots usually found with short fallow periods. In these cases, fallow fields develop grassy vegetation, which is still cleared at the end of fallow period with the help of fire. The burning not only disposes the unwanted vegetation but also releases a considerable amount of mineral nutrients which are often essential for productivity of fields. On this basis, it can be said that the expansion of dry-field cultivation in the middle Ganga plain through slash-and-burn technology also, might have represented the artificial creation of habitats, for growing the drought resistant *jowar, ragi* and *bajra* millets.

Arguments in this regard remain for the time being entirely in the hands of ecologists. Opinions al subject to different interpretations depending upon the background of experience. The magnitude of human disturbances in the creation of artificial habitats around the early settlements, would have been on the extent of clearings. Fire would have created the desired habitats of drier tropical zone, suitable for millet crops, without necessitating changes in the ecological adaptation of the crops themselves. At the same time, it was definitely a readily simple device for Neolithic and Chalcolithic farming communities.

Diffusion of Agricultural Traits

What is most pertinent and crucial to note that the crops of wheat, barley, lentil, field-pea, African millets, etc. which were mainstay in the agricultural prosperity of advanced Harappans in the north-western regions, made a bulwark in the agriculture of Neolithic-Chalcolithic rural communities up to the regions in Bihar. On the other hand, the rice from the region of Ganga plain spread and held ranking in the agriculture of Early and Mature phases of Harappan Civilization in the regions of Haryana. The problem of the diffusion of agricultural traits in strict cultural apprehension, having established the spatial expression of crop plants in two-way avenues between the culturally and environmentally contrasting regions during third millennium BC, does not appear to be so simple. This aspect came up to be initially discussed recently in the archaeological background of the middle Ganga plain (Saraswat 2004: 137-171). A botanist may not be so much concerned with the diverse cultural complexes diffused over a wide zone, as with those of crop remains that act as indicators of agricultural expansion. Our main concern of discussion is of crop dispersal, which has drawn our attention to the long distance migration of crops and agricultural systems, during much ancient times during 3rd millennium BC. It presents a problem to archaeological research which will surely attract attention in future. In the present context it is relevant to remark that agro-economic zones crossed climatic and vegetational territories and became fully established between the Harappans in the north-western India and the peoples of Neolithic-Chalcolithic cultures in the middle Ganga plain.

Some archaeological consideration will not be out of place here. It is sometimes possible to find incontrovertible proof of contact on archaeological grounds, when and where it did occur. The discovery of particular type of pottery and other artifacts brought with it, could give some inescapable conclusion that some trans-regional contact had existed. Yet, even when contacts between two regions did not in fact occur, it is logically impossible to prove the point. No conceivable find can ever show that contact did not take place. All that can be said is that the absence of evidence to the contrary makes the assumption tenable, which is not a conclusive statement. This being so, the task of the proof must always be on those arguing contact as a significant factor in initiating cultural or agricultural change. Quite clearly we do not have all the convincing answers as to time, motivation, dispersal, routes of direct or indirect diffusion in the archaeological lexicon of northern India, and equally clearly the waters have been considerably muddled in the archaeology, especially by inventiveness of spanning the cultural spreads on the grounds of ceramic typology. Corridors are two-way avenues and there is no reason to suppose that the corridors of agricultural diffusion of which we are speaking, were not operative in much earlier times during 3rd millennium BC. The question must next be faced as how this process of gradual diffusion unfolded and how farming and its correlates spread between apparently independent cultural zones of north-western India and middle Ganga plain. Not only the distance was great, but the geographical barriers were major, whether gatherers or farmers, slowly from one region to another and generation after generation, took the high bridle-path across the vast zone.

A Comment on Environment Screening

The need for climatic reconstruction stems to conceive the economic and technological advancement of ancient human settlements. For this reason, a variety of natural and cultural phenomena linked in some fashion to climate, are investigated. A generalized annotation in this regard is given here. Some investigations have been carried out in strictly discipline-oriented approaches, to have contributed for the reconstruction of past environment. Biological evidence include both flora and fauna. Far more impressive are pollen data. Some palynological studies from the lake-beds in the middle Ganga plain have been carried out (Gupta 1978: 109-119; Chauhan *et al.*, 1990: 191-194; Sharma *et al.* 2001: 199-202). Barring some sketchy information, the middle Ganga plain, however, has not received much attention regarding palaeo-climate, floristic antiquity and inception of anthropological activities. Recent studies carried out from Lahuradewa lake-beds has come out exuberantly with the reconstruction of palaeo-vegetational and climatic changes since 9500 years BP (Chauhan *et al.* 2004: 41), and this investigation would certainly astound for its relevance in the human past. Palynological sections, archaeological stratifications and historical records combinely are expected in future to approach the questions of climatic changes with more precise dates and more hope of ascertaining causes and effects in determining the adaptations of farming cultures in the region. Not withstanding the considerable success of palynological studies in deciphering former vegetation, climate and land use, pollen researches cannot hope to answer many questions. The value of alternative complementary source of information is well illustrated in the macro-remains. The studies of wood charcoals and the remains of weeds and wild taxa being carried out at Birbal Sahni Institute of Palaeobotany, would help to resolve some problems which the pollen data cannot reveal. The time is now ripe for multi-disciplinary approaches, the questioning and considering of the archaeological perspectives in the region, and growing concern with social structures, economic processes & colonization of farming communities in the past environmental conditions.

Some basic considerations in the environmental conditions of early farming communities, deserve due attention of traditional archaeologists. Every human society must somehow come to terms with its environment, and every such society must deal with some inconstancy in its surroundings. Cares of mankind in all the times facing the need for an improved agriculture and failing to see it, would have been obvious in the pre-history. Archaeological sites provide us information about contemporary use of crops and animals, and these together with more accidental finds. Weeds and wild taxa make it possible to some extent to assume what the local flora was. Some indications about the background of contemporary climatic conditions are perceived, but it is unlikely that such a body of data empirically will produce evidence of environmental change. Analysis of pollen from geological deposits is a major source of data for palaeo-ecological reconstruction. It is unlikely that pollen and phytoliths recovered in a lake core were carried out their by humans. Cultural selection has no impact on lake deposits. Vegetational changes recorded in the geological deposits may distantly be the result of human activities taking place far away from the sampling locus, however. Determining whether such changes are due to natural causes or are human induced, is difficult. In archaeo-botanical context, the reliance must be placed upon the macro-remains of man and plant interaction in the archaeological site, and certainly not from the lake sediments for deducing past economy.

Further, fundamental objection to explanations that regard climatic change as a primary factor in archaeology is that they fail to demonstrate precisely how a secular change in climate can affect human activities. These environmental interpretations rest on the assumption that climatic change induces adjustments in the distribution and density of plant communities on which human population depended, but they usually fail to specify the nature of those adjustments with precision that the hypothesis may be tested against empirical evidence. When a society, especially the agricultural society, accommodates to environment, it does so, partly if not wholly, through making some transformations in the environment. Hunter and gatherers are usually thought of as having only a limited capacity to change their physical environment, because of their low population and simple technical equipments. But, it tends to underestimate the great potential for environmental change: their use of fire. Harris (1977: 179-243) has categorically affirmed that no other categories of environmental change induced by man appear to have potential significance as stress factor equivalent to the effects of burning vegetation. What we are dealing with, is a complex, multifaceted adaptive system of farming communities in the region of Ganga plain; single all-efficient explanation of environmental adaptation cannot be regarded with certainty. One of the leading American anthropologists George F. Carter (Carter 1977: 89-133) states – "The physical environment does not compel, suggest, hint, encourage it is simply there. Men perceive their environment through cultural filters and behave accordingly". Having these reservations in mind, it seems desirable to consider environmental, social and cultural changes in the pre-history, in a varying degree of directedness and continuity. A balanced statement may make allusion that these early farming communities accommodated to environmental influences through partly transforming the natural environmental zones by creating artificial habitats for the cultivation of the varied crops, around their settlements.

Epilogue

Certainly there is a need for better understanding between archaeologists and natural scientists. Without this, each will not obtain full benefit from other, and the benefits are real. The field with which I am concerned here, I have attempted to apply the accumulated evidence to explain the state of agriculture in the middle Ganga plain. Some of my presumptions may be wrong but the evidence should be reproducible. Greater skill may be demanded of archaeologists in this gathering of the workshop, because the interpretive component is often greater and some of the observations cannot be reproduced at will. I feel that in rejecting the anthropological vocabulary in archaeology, we will reject much of the language in which the state of farming communities could be justifiably projected. Fact collecting of itself is insufficient procedure. Facts exist only as they are related to theories, and theories are not destroyed by the facts. They are replaced by new theories, which better explain the facts. Therefore, the criticisms which concern facts alone, and which fail to offer alternative explanations are of no interest in the multi-disciplinary approach. Where a vision is limited, action is circumscribed. It is hence the concern of all of us in the workshop to enlarge the vision on "Middle Ganga Plain Archaeology", in view of the working hands and their dedication for the cause. Do we have sufficiently and qualified botanists to undertake this work? If we do not, will it be possible for the future training to include identification of plant remains, as an area of specialization and competence? I wish to opportunely emphasize the need for collaborative archaeological approach in the Ganga plains. While a person like me enjoins in his opinions, he may be less than cautious in his own generalizations about early farming communities in the region. My discussion may sound argumentative and lamentably thin in spots. Apologetically, I really meant to generate questioning in this gathering of the workshop.

BIBLIOGRAPHY

Agarwal, D.P., R.V. Krishnamurthy, S. Kusumgar and R.K. Pant 1977. Physical Research Laboratory Radiocarbon Date List II. *Radiocarbon* 19 (2): 229-36.

Anderson-Gerfaud, P.C. 1988. Using Prehistoric Stone Tools to Harvest Cultivated Wild Cereals: Preliminary Observations of Traces and Impact. In *Industries Lithiques, Traceologie et Technologie*. S. Beyries (ed.): 175-195. British Archaeological Reports, Oxford.

Anonymous, 1972. *The Wealth of India: Raw materials*, Vol. IX (Rh-So). New Delhi: CSIR.

Arkell, A.J. and P.J. Ucko 1965. Review of Pre-Dynastic Development in the Nile Valley. *Current Anthropology* 6: 145-156.

Bartlett, H.H. 1962. Possible Separate Origin and Evolution of the Ladang and Sawah Types of Tropical Agriculture. *Proceedings* of *the Ninth Pacific Science Congress*, Vol. 4 (Botany): 270-273.

Bourreil, P. 1972. Quoted in Personal Communication by R.O. Whyte 1973. An Environmental Interpretation of the Origin of Asian Cereals. Paper presented at second *SABRAO Congress, IARI*, New Delhi.

Carter F. George 1977. A Hypothesis Suggesting a Single Origin of Agriculture. In *Origins of Agriculture*. Charles A. Reed (ed.): 89-133. Paris: Mouton Publication.

Chakrabarti, D.K. 1972-73. Concept of Urban Revolution and the Indian Context. *Purattatva* 6: 27-36.

Chang, T.T. 1976a. The Rice Cultures. *Phil. Trans. R. Soc. London, Ser. B.* 275: 143-157.

Chang, T.T. 1976b. The Origin, Evolution, Cultivation, Dissemination and Diversification of Asian and African Rices. *Euphytica* 25: 425-441.

Chang, T.T. 1985. Crop History and Genetic Conservation: Rice - A Case Study. *IOWA State Journal of Research* 59 (4): 425-455.

Chauhan, M.S., A. Khandelwal, S.K. Bera and H.P. Gupta 1990. Pollen Analysis of Kathauta Tal, Chinhat, Lucknow. *Geophytology* 21: 191-194.

Chauhan, M.S., A.K. Pokharia and I.B. Singh 2004b. Pollen Records of Holocene Vegetation and Climate Change from Lahuradewa Lake. In *Abstract: Joint Annual Conference (IAS, ISPQS, IHCS) and National Seminar on the Archaeology of the Ganga Plain (28-31 December 2004)*: 41. Lucknow: Directorate of U.P. State Archaeology.

Costantini, L. 1984. The Beginnings of Agriculture in the Kacchi Plain: The Evidence of Mehrgarh. In *South Asian Archaeology 1981*. B. Allchin (ed.): 29-33. Cambridge: Cambridge University Press.

Costantini, L. and Biasini, L. Costantini 1985. Agriculture in Baluchistan between the 7th and 3rd Millennium BC. *Newsletter of Baluchistan Studies* 2: 16-30, tables 4-7.

De Candolle, A. 1886. *Origin of Cultivated Plants.* London: Kegen Paul Trench & Co.

Dixit, Aruna S. 1987. Oldest Neolithic Barley from India. *National Academy Science Letters* 10 (4): 125-127.

Evans, L.T. 1976. Physiological Adaptation to Performance as Crop Plants. *Phil. Trans. R. Soc. London, Ser. B.* 275: 71-83. Great Britain.

Fluckiger and Hanbury 1892. Pharmacography 567. *Dictionary of Economic Products of India* 6 (1).

Gorman, Chester 1977. A Priori Models and Thai Prehistory: A Reconsideration of the Beginnings of Agriculture in Southeastern Asia. In *Origins of Agriculture*. Charles A. Reed (ed.): 321-355. Paris: Mouton Publication.

Gupta, H.P. 1978. Holocene Palynology from Meander Lake in the Ganga Valley, District Pratapgarh, U.P. *Palaeobotanist* 25: 109-119.

Haines, H.H. 1925 (Reprinted, 1978). *The Botany of Bihar and Orissa*, Part-I. Dehradun: M/s Bishen Singh Mahendra Pal Singh.

Hanks, Lucien M. 1972. *Rice and Man: Agricultural Ecology in Southeast Asia.* Chicago: Aldine-Atherton.

Harlan, J.R. 1975. Crops and Man. *American Society of Agronomy and Crop Science Society of America.* Madison: Wisconsin.

Harlan, J.R. 1976. Plant and Animal Distribution in Relation to Domestication. *Philos. Trans. R. Soc. London* 275: 13-25.

Harlan, J.R. 1977. The Origins of Cereal Agriculture in the Old World. In *Origins of Agriculture.* Charles A. Reed (ed.): 357-383. Paris: Mouton Publication.

Harlan, J.R. 1989. Wild Grass-Seed Harvesting in the Sahara and Sub-Sahara of Africa. In *Foraging and Farming: The Evolution of Plant Exploitation.* D.R. Harris and G.C. Hillman (eds.): 79-98. London: Unwin and Hyman.

Harris, David R. 1977. Alternative Pathways Toward Agriculture. In *Origins of Agriculture,* Charles A. Reed (ed.): 179-243. Paris: Mouton Publication.

Harris, M. 1975. *Culture, People, Nature: An Introduction* to *General Anthropology.* New York: Crowell.

Helbaek, H. 1969. Plant Collecting, Dry-farming and Irrigation Agriculture in Prehistoric Deh Luran. In *Prehistory and Human Ecology of the Deh Luran Plain.* F. Hole, K.V. Flannery and J.A. Neely (eds.): 383-426. Ann Arbor: University of Michigan.

Helbaek, Hans 1952. Miscellanea. *Acta Archaeologica* 23: 97-107. Ejnar Munksgaard, Copenhagen.

Higgs, E.S. and M.R. Jarman 1969. The Origins of Agriculture: A Reconsideration. *Antiquity* 43: 31-41.

Hillman, G.C. and M. Stuart Davies 1990. Measured Domestication Rates in Wild Wheats and Barley Under Primitive Cultivation and their Archaeological Implications. *Jour. of World Prehistory* 4 (2): 157-222.

Hilterbrandt, U.M. 1935. *Lenin Acad. Agric. Sci. Inst. Plant Industry, Moscow and Leningrad* 6: 55.

Ho, Ping-Ti 1969. The Loess and the Origin of the Chinese Agriculture. *American Historical Review* 75:1-36.

Ho, Ping-Ti 1977. The Indigenous Origins of Chinese Agriculture. In *Origins of Agriculture.* Charles A. Reed (ed.): 413-481. Paris: Mouton Publication.

Hooker, J.D. 1878. *The Flora of British India,* V. Royal Gardens, Kew (Reprinted 1973: B/S Bishen Singh Mahendra Pal Singh, Dehradun and M/S Periodical Experts, Delhi).

Hsi-an Pan-p 'O. 1963. Peking.

Hutchinson, Sir Joseph 1976. India: Local and Introduced Crops. *Phil. Trans. R. Soc. Lond.* B. 275: 129-141. Great Britain.

Jarrige, J. and R. H. Meadow 1980. The Antecedents of Civilization in the Indus Valley. *Scientific American* 243 (2): 122-133.

Kajale, M.D. 1991. Current Status of Indian Palaeoethnobotany: Introduced and Indigenous Plants with a Discussion of the Historical and Evolutionary Development on Indian Agricultural Systems in General. In *New Light on Early Farming: Recent Developments in Palaeoethnobotany.* J.M. Renfrew (ed.): 155-189. Edinburgh: Edinburgh University Press.

Meadow, R.H. 1984. Notes on the Faunal Remains from Mehrgarh, with a Focus on Cattle (Bos). In *South Asian Archaeology 1981.* B. Allchin (ed.): 34-40. Cambridge: Cambridge University Press.

Mehra, K. L. and R.K. Arora 1978. Considerations on Domestication of Plants in India. Paper presented at symposium: *Recent Advances Indo-Pacific Prehistory*, Pune.

Mehra, K.L. 1997. Biodiversity and Subsistence Changes in India: The Neolithic and Chalcolithic Age. *Asian Agri-History* 1 (2): 105-126.

Mehra, K.L. 2002. Agricultural Foundation of Indus-Saraswati Civilization. In *Agricultural Heritage of India.* Y.L. Nene and S.L. Choudhary (eds.) *Proceedings of National Conference held at Rajasthan College of Agriculture.* Udaipur: Maharana Pratap University of Agriculture and Technology.

Mehra, K.L. 2003. The Dispersal of Plant Cultivars between Prehistoric Africa and South Asia. In *Introduction of African Crops into South Asia.* V.N. Misra and M.D. Kajale (eds.): 79-98. Pune: Indian Society for Prehistoric and Quaternary Studies.

Murray, J. 1970. *The First European Agriculture.* Edinburgh: Edinburgh University Press.

Nayar, N.M. 1976. Sesame: *Sesamum indicum* (Pedaliaceae). In *Evolution of Crop Plants.* N.W. Simmonds (ed.): 231-233. London & New York: Longman.

Nayar, N.M. and K.L. Mehra 1970. Sesame: Its Uses, Botany, Cytogenetics and Origin. *Econ. Bot.* 24: 20-31.

Oka, H. I. and W.T. Chang 1959. The Impact of Cultivation on Populations of Wild Rice: *Oryza sativa* f. *spontanea. Phyton* 13: 105-117.

Pal, J.N. 1986. *Archaeology of Southern Uttar Pradesh (Ceramic Industries of North Vindhyas).* Allahabad: Swabha Prakashan.

Phillips, L.L. 1976. Cotton: Gossypium (Malvaceae). In *Evolution of Crop Plants.* N.W Simmonds (ed.): 196-200. London & New York: Longman.

Possehl, G.L. and P.C. Rissman 1992. The Chronology of Prehistoric India: From Earliest Times to Iron Age. In *Chronology in the Old world Archaeology Vol. I.* R.W. Ehrich (ed.): 465-474. Chicago and London: The University of Chicago Press.

Reed, Charles, A. 1977. Origins of Agriculture: Discussion and Some Conclusions. In *Origins of Agriculture.* Charles A. Reed (ed.): 881-953. Paris: Mouton Publication.

Reynolds, P. 1981. Deadstock and Livestock. In *Farming Practice in British Prehistory.* R. Mercer (ed.): 97-122. Edinburgh: Edinburgh University Press.

Riley, R. 1976. Concluding Remarks - The Evolution of Crops and Agriculture. *Phil. Trans. R. Soc. Lond.* B. 275: 209-213. Great Britain.

Salisbury, E. 1974. Seed Size and Mass in Relation to Environment. *Proc. R. Soc. Lond.* B. 186: 83-88.

Sampath, S. and S. Govindaswami 1958. Wild Rices in Orissa: Their Relationship to Cultivated Varieties. *Rice News Letter* 6 (3): 7-20.

Santhanum, V. and J.B. Hutchinson 1974. Cotton. In *Evolutionary Studies in World Crops Diversity and Change in the Indian Sub-continent.* Sir Joseph Hutchinson (ed.): 89-100. Cambridge: Cambridge University Press.

Saraswat, K.S. 2004. Plant Economy at Mesolithic Damdama, Pratapgarh District, U.P. *Abstract-Joint Annual conference of lAS, ISPQS and IHCS and National Seminar on the Archaeology of the Ganga Plain:* 47. Lucknow: U.P. State Archaeology Department.

Saraswat, K.S. 1992. Archaeobotanical Remains in Ancient Cultural and Socio-economical Dynamics of the Indian Sub-continent. *Palaeobotanist* 40: 514-545.

Saraswat, K.S. 1995. *Annual Report: Birbal Sahni Institute of Palaeobotany 1994-95: 116.* Lucknow: Birbal Sahni Institute of Palaeobotany.

Saraswat, K.S. 2004. Plant Economy of Early Farming Communities. In *Early Farming Communities of the Kaimur* Vol. II. B.P. Singh (ed.): 416-535. Jaipur: Publication Scheme.

Saraswat, K.S. and A.K. Pokharia 2002. Harappan Plant Economy at Ancient Balu, Haryana. *Pragdhara* 12:153-171.

Saraswat, K.S. and A.K. Pokharia 2003. Palaeoethnobotanical Investigations of Early Harappan Kunal. *Pragdhara* 13: 105-139.

Saraswat, K.S. and A.K. Pokharia 2004. Plant Economy at Lahuradewa – A Preliminary Contemplation. *Abstract: Joint Annual Conference (IAS, ISPQS, IHCS) and National Seminar on the Archaeology of the Ganga Plain (28-31 December 2004)*: 46-47. Lucknow: Directorate of U.P. State Archaeology.

Saraswat, K.S. and Anil K. Pokharia 2004. Plant Economy at Lahuradewa: A Preliminary Contemplation. *Abstract: Proc. Joint Annual Conference of lAS, ISPQS and IHCS and National Seminar on the Archaeology of the Ganga Plain:* 46-47. Lucknow: U.P. State Archaeology Department.

Saraswat, K.S. 2004. Plant Economy in Ancient Malhar. In *Report of the Excavations at Malhar, District Chandauli, U.P. 1998-99*. Tewari, R., R.K. Srivastava, K.S. Saraswat, K.K. Singh (eds.): 137-171. Lucknow: Directorate of U.P. State Archaeology.

Saraswat, K.S., D.C. Saini, N.K. Sharma and Chanchala 1990. Palaeobotanical and Pollen Analytical Investigations. *Indian Archaeology: 1985-86 - A Review*: 122-125. ASI, New Delhi.

Saraswat, K.S., N.K. Sharma and D.C. Saini 1994. Plant Economy at Ancient Narhan. In *Excavations at Narhan (1984-89)*. P. Singh (ed.): 255-346. Varanasi and Delhi: Department of AIHC and Archaeology, BHU & B.R. Publishing Corporation.

Savithri, R. 1976. Studies in Archaeobotany Together with its Bearings upon Socio Economy and Environment of Indian Proto historic Cultures. Ph.D. Thesis (Unpublished). Lucknow: University of Lucknow.

Sharma, A. 1983. Further Contributions to the Palaeobotanical History of the Crops. Ph.D. Thesis (Unpublished). Lucknow: University of Lucknow.

Sharma, C., M.S. Chauhan, S. Sharma, M. Sharma and I.B. Singh 2001. Proxy Records of Holocene Vegetation and Climate Change from Sanai Tal, Central Ganga Plain, Uttar Pradesh. *National Symposium: Role of Earth Sciences Integrated Development and Related Social Issues*. Special Publication No. 65 (3): 199-202. New Delhi: Geological Survey of India.

Sharma, G.R. 1980. *History to Prehistory: Archaeology of Ganga Valley* and *Vindhyas*. Allahabad: University of Allahabad.

Sharma, G.R. 1985. From Hunting and Food Gathering to Domestication of Plants and Animals in the Belan and Ganga Valleys. In *Recent Advances in Indo-Pacific Prehistory*. V.N. Misra and P. Bellwood (eds.): 369-371. New Delhi – Bombay - Calcutta: Oxford & IBH Publication Company.

Sharma, G.R., V.D. Misra, D. Mandal, B.B. Misra and J.N. Pal 1980. *Beginnings of Agriculture*. Allahabad: Abinash Prakashan.

Sharma, S.D. and S.V.S. Shastry 1965. Taxonomic Studies in Genus *Oryza* L, Vol. III: O. *rufipogon* Griff. Sensu stricto and O. *nivara* Sharma et Shastry nom. Nov. *Indian Journ. Genet.* 25: 157-167.

Singh, B.P. 1990. Early Farming Communities of Kaimur foot-hills. *Puratattva* (1988-89) 19: 6-18.

Singh, B.P. 1989. Khairadih - A Chalcolithic Settlement. *Puratattva* 18: 28-34.

Singh, B.P. 2004. *Early Farming Communities of the Kaimur*, Vols. I & II. Jaipur: Publication Scheme.

Singh, P. 1993. Archaeological Excavations at Imlidih Khurd - 1992. *Pragdhara* 3: 21-35.

Singh, P. 1994a. Further Excavations at Imlidih Khurd - 1993. *Pragdhara* 4: 41-48.

Singh, P. 1994b. *Excavations at Narhan (1984-89)*. Varaṇasi and Delhi: Banaras Hindu University and B.R. Publishing Corporation.

Singh, P. and A.K. Singh 1996. Trial Excavations at Waina, District Ballia (U.P.). *Pragdhara* 6: 41-61.

Singh, P., A.K. Singh and Indrajeet Singh 1992. Excavations at Imlidih-Khurd. *Puratattva* 22: 120-22.

Tewari, R. and R.K. Srivastava 1997. Excavations at Raja-Nala-ka-Tila (1995-96), District Sonbhadra (U.P.): Preliminary Observations. *Pragdhara* 7: 77-95.

Tewari, R. and R.K. Srivastava 1998. Excavations at Raja Nal-ka-Tila (1996-97), District Sonbhadra (U.P.): Preliminary Observations. *Pragdhara* 8: 99-105.

Tewari, R., R.K. Srivastava, K.K. Singh, K.S. Saraswat, I.B. Singh 2003. Preliminary Report of the Excavation at Lahuradewa, District Sant Kabir Nagar, U.P. 2001-2002: Wider Archaeological Implications. *Pragdhara* 13: 37-68.

Tewari, R., R.K. Srivastava, and K.K. Singh 2004. Report of the Excavations at Malhar, District Chandauli (Uttar Pradesh) India: 1998-99. *Pragdhara* 14: 1-112.

Tewari, R., R.K. Srivastava, K.S. Saraswat and K.K. Singh 2000. Excavations at Malhar, District Chandauli (U.P.) 1999: A Preliminary Report. *Pragdhara* 10: 69-98.

Tewari, R., R.K. Srivastava, K.K. Singh, K.S. Saraswat and I.B. Singh 2003. Preliminary Report of the Excavation at Lahuradewa, District Sant Kabir Nagar, U.P. 2001-2002: Wider Archaeological Implications. *Pragdhara* 13: 37 -68.

Tewari, R., R.K. Srivastava, K.K. Singh, R. Vinay, R.K. Trivedi, G.C. Singh 2005. Recently Excavated Sites in the Ganga Plain and North Vindhyas: Some Observations Regarding the Pre-Urban Context. *Pragdhara* 15: 39-49.

Valentine, D.H. 1970. Evolution at Zones of Vegetational Transition. *Feddes Report* 81: 33-39.

Vavilov, N.I. 1951. *The Origin, Variation, Immunity and Breeding of Cultivated Crops.* New York: Chronica Botanica.

Vishnu-Mittre 1978. Origins and History of Agriculture in the Indian Sub-continent. *Journal* of *Human Evolution* 7: 21-36.

Watt, G. 1892. *A Dictionary of the Economic Products of India*, 6. London: W.H. Allen and Company.

Wendelbo, P. 1971. Alliaceae. In *Flora Iranica*. K.H. Rechinger (ed.): 76:100. Graz, Austria.

Whitaker, Thomas W. 1976. Cucurbits: Cucumis, Citrullus, Cucurbita, Lagenaria (Cucurbitaceae). In *Evolution of Crop Plants.* N.W Simmonds (ed.): 64-69. London & New York: Longman.

Whyte, R.O. 1973. An Environmental Interpretation of the Origin of Asian Cereals. Paper presented at second *SABRAO Congress, IARI*, New Delhi.

Whyte, R.O. 1977. The Botanical Neolithic Revolution. *Human Ecology* 5:209-222.

Wilke, P.J., Robert Bettinger, Thomas F. King, James F. O'Connell 1972. Harvest Selection and Domestication in Seed Plants. *Antiquity 46*: 203-209.

Yasuda, Yoshinori 2002. Origins of Pottery and Agriculture in East Asia. In *The Origins of Pottery and Agriculture.* Yoshinori Yasuda (ed.): 151-156. New Delhi: Lustre Press.

Zhukovsky, P.M. 1968. New Centers of Origin and New Gene Centers of Cultivated Plants including especially Endemic Microcenters of Species closely allied to Cultivated Species. *Bot. Zh.* 13: 430-460.

RANJIT PRATAP SINGH

Beginning of Agriculture in the Ganga Plain

Recent field researches in the archaeology of the Ganga plain have revealed a sequence of proto-historic and early historical cultures from the Neolithic through Chalcolithic and early historical times. All these cultures flourished without any significant break because they had assured food supply on account of cultivation of cereal plants and domestication of certain species of animals. It is therefore worthwhile to examine the agricultural background of these cultures.

The transition from foraging to farming which began some ten thousand years ago was most fateful change as it could support more people, per unit area of exploited land. It thus facilitated long-term sedentary settlement and maintenance of large and more complex social groups, which, in turn enabled urban society to develop. The beginning of agriculture, variously termed as "Food Producing Revolution", the "Neolithic Revolution" or the "Agricultural Revolution", not only changed the subsistence pattern of man but at the same time brought in significant changes in his socio-economic pattern.

Mesolithic and Proto-Neolithic Sites

Intensive explorations conducted by the University of Allahabad and Banaras Hindu University during the sixties and seventies of the preceding century resulted into the discovery of more than 500 Mesolithic sites, mainly in the eastern Vindhyas and the middle Ganga valley. In the Vindhyas, the discovered Mesolithic sites lie in the districts of Sidhi, Satna, Rewa in Madhya

Pradesh and Banda, Allahabad, Mirzapur, Sonbhadra and hilly parts of Chandauli in eastern Uttar Pradesh. In the middle Ganga valley, the Mesolithic sites are located in parts of Allahabad, Varanasi, Pratapgarh, Jaunpur and Sultanpur districts of Uttar Pradesh (Misra 1997: 32). Of the 500 sites listed above, nearly 200 sites are located in the middle Ganga valley. This increase in the number of Mesolithic sites is indicative of a spurt in the population. Evidence regarding harvesting of wild cereals (rice) comes from Chopani-Mando. Hence, this evidence has been examined in detail in the following pages.

Chopani Mando

Chopani Mando is located about 77 km south-east of Allahabad on the middle terrace of the Belan river. This site, spread over an area of 15000 sq m, was subjected to excavation in 1967 and again in 1977-78 by Professor G.R. Sharma. The excavation brought to light a total habitational deposit of 1.55 m in thickness, comprising 10 layers divisible in the following three phases:

(i) Epipalaeolithic (comprising tools of upper Palaeolithic as well as early Mesolithic culture).

(ii) Early Mesolithic (comprising non-geometric microliths in sub-phase, an unassociated with pottery. In sub-phase B, geometric microliths are present).

(iii) Advanced Mesolithic on proto-Neolithic: Plans of 13 circular or oval huts and four hearths have been exposed. This phase is characterized by the emergence of handmade pottery with bowls and vases as the main types.

Remains of charred or carbonized rice were found embedded in lumps of burnt clay from the proto-Neolithic levels of this site. These have been dated to the 9th-8th millennium BP (Agrawal and Kharakwal 2002: 85) and represent the wild variety of rice. However, the samples are still under examination. This is a very important find, particularly in view of the occurrence of domesticated rice and handmade pottery from the Neolithic levels at Koldihwa and Mahagara in the same region.

In the absence of any ^{14}C dates from Chopani Mando, it is difficult to assess the chronology of this site. However, keeping in view the date of Epipaeolithic of the Belan river (17765±340 BC), together with the radiocarbon date from Sarai Nahar Rai (8395±110 BC) and the date from Koldihwa (5440±240 BC), the entire occupational deposit of Chopani Mando has been tentatively placed within a time span of 17000 to 7000 BC (Misra 1989: 108).

Neolithic Sites

The succeeding stage of cultural evolution is termed as Neolithic. This stage was marked by the breeding of wild animals and cultivation of selected wild grasses. The first animals to be domesticated were dog, cattle, sheep and goat and the first plants to be cultivated were rice, wheat and barley. This change occurred around ten thousand years ago or even earlier in the vast stretch of mountainous and hilly environment, extending from the east coast of the Mediterranean to the eastern edge of Baluchistan plateau, as also in the Yangtze valley in China (Yasuda 2002). In India, evidence of Neolithic culture have been found in north-western India, Kashmir, the Vindhyan region, mid Ganga valley, south-eastern India, north-eastern India and southern India. The Neolithic cultures of these regions are characterized by sedentary settlements, cultivation of cereal plants, domestication of selected animals, ground stone industries including a microlithic component, handmade pottery, etc. In the middle Ganga valley, evidence of Neolithic settlements comes from Lahuradeva (Sant Kabir Nagar), Sohagaura and Imlidih Khurd in Gorakhpur district of Uttar Pradesh and Chirand, Chechar-Kutubpur, Taradih and Senuwar in Bihar. The excavations, though conducted on a limited scale, have brought to light the evidence of wattle-and-daub structures. Traces of post holes have been noticed. Screen walls of huts were made of split bamboo reeds, the impressions of which have been found in the burnt clay lumps. The hutments appear to be round or oval on plan. At Chirand, evidence of pit dwelling has also been reported.

The excavations have yielded rich data regarding the ceramics used by the Neolithic inhabitants of the Ganga valley. In the early stages, they used to make handmade pottery but the use of wheel-turned pot has also been reported from some of the Neolithic sites (Senuwar) from the upper strata of this culture. Corded ware appears to be a characteristic trait of the Neolithic culture, both of the Vindhyas and of the mid Ganga valley. Other ceramic industries comprise ordinary red ware, burnished ware, rusticated ware, black-and-red ware, lustrous ware and lustrous red ware. The principal types are bowls with varying profiles, vases, squatted vessels and miniature jars. The clay used for pottery contains gritty rice husk and chaff as degraissant. A limited number of painted shards have also been reported from Chirand and Senuwar. These post-firing paintings confined to the rim have been executed in red ochre. At Chirand, the painted motifs include a linear design of criss-cross lines and concentric circles. This diversity of ceramic industries and types strongly suggests that the potters had acquired sufficient technical skill in ceramic tradition.

The stone objects of Neolithic culture comprise flakes, blades, scrapers, arrowheads, points, lunates and borers made on cilicious stones such as chert, chalcedony, agate, jasper, quartz, etc. Rounded celts of basalt and granite have been found at both Chirand and Senuwar. Bone objects constitute another trait of the Neolithic culture of the middle Ganga valley. They include celts, scrapers, stylie and arrowheads. Excavations at Chirand have yielded a vast amount of such objects. In this context, it may be noted that with the exception of the Neolithic sites of the Kashmir valley, Chirand is the only Neolithic site in India to produce bone objects, both in quality and variety (Misra and Gupta 1995: 26). Terracotta objects from the Neolithic sites in the middle Ganga valley are not plenteous but Chirand had yielded terracotta wheels, beads, bangles, cakes and bird and serpent figurines.

As stated above, the domestication of animals and cultivation of cereal plants are the hallmark of the Neolithic culture. Thus, the Neolithic people of the middle Ganga valley also cultivated wheat, barley, rice, field pea, lentil, *masur, moong*, etc. Evidence from Senuwar and Chirand is copious. Rice appears to be the stable food of the Neolithic people. Evidence of cultivated rice, along with its wild progenitor, has been recently found (Tewari *et al.* 2003) embedded in the core of a number of potshards from Lahuradeva from Period IA. The two radiocarbon dates found from this level have been dated to 5298 ±160 and 4196± 90BC (BS-1966 and BS-1951) respectively. Thus, the cultivation of rice now goes back to the late sixth and fifth millennium BC in the Saryupar area of the middle Ganga valley. Bones of cattle, buffalo, elephant, rhinoceros, stag and deer have been found from these sites. Of these, cattle and buffalo were domesticated while stag and deer were obviously hunted. As rhinoceros has never been domesticated, during the Neolithic phase also it would have roamed in the marshy area in the middle Ganga valley (Misra and Gupta 1995: 27).

To fix the chronology of Neolithic culture of the middle Ganga valley, the dates of Chirand and Senuwar may be taken into consideration. Two radiocarbon dates reading 1760±150 BC and 1680±135 BC push back the beginning of the Neolithic culture around 2000 BC at Chirand. The overlap phases of the Neolithic-Chalcolithic levels at Senuwar have provided four radiocarbon dates. All these dates, taken together, push back the beginning of the Neolithic culture earlier than 2000 BC. The newly obtained dates from Lahuradeva place this culture around 6000 - 5000 BC but this hypothesis needs to be supported by more data.

Koldihwa

Koldihwa is the key-site for understanding the beginning of agriculture in the mid Ganga plain, as it provides one of the earliest evidence of domesticated rice in India. Situated on the left bank of river Belan in the Meja Tehsil of district Allahabad, this site was excavated by the University of Allahabad from 1972-1973 to 1975-1976, which yielded remains of a Neolithic culture comprising corded ware, incised ware, and ill-fired crude black-and-red ware - all handmade, together with Mesolithic tools made of chert and chalcedony. The Neolithic of Koldihwa was followed by a Chalcolithic phase and finally, by Iron Age deposits.

Remains of rice from the Neolithic deposits are one of the most significant discoveries of this excavation. These domesticated rice remains comprise seed without pericarp, impression of caryopsis, stalk, glume and probably also spikelets. They have been found in loose form as well as embedded in pot sherds. The imprints of caryopsis, stalk, glume, etc. have been found only on pot sherds, especially on the cord-impressed and rusticated wares. It is obvious that they have been used to temper the clay so as to manufacture the pots. A preliminary palaeo-botanical analysis of the rice husk by Vishnu Mittre of BSIP, Lucknow and Te-Tzu Chang of the International

Rice Research Institute, Manila, Philippines, reveals that they belong to the domesticated *Oryza sativa* group. The radiocarbon dates from Koldihwa give a bracket of *circa* 9000-8000 years BP. A ^{14}C date from the pre-Neolithic Mahagara is 8080±115 BC (Sharma *et al*. 1980; Pal 1990; Agrawal and Kharakwal 2002: 85).

In the Saryupar plain the Chalcolithic cultures have been identified at Sohagaura, Narhan, Khairadih and other sites. At all these sites, this phase is characterised by the occurrence of black-and-red ware (plain and painted), black-slipped ware (plain and painted) red ware (both slipped and unslipped), burnished black ware, cord-impressed pottery and rusticated ware. The last three wares are found in limited number. At Narhan the painted black slipped ware is meagre, the prominent ware being the painted black-and-red ware. About twenty percent sherds in this ware are reported. On the contrary, the painted black slipped ware is the prominent industry at Khairadih (Singh 1992: 78).

Other common noteworthy finds at Khairadih, Narhan and Sohagaura constituted beads of agate, chalcedony, carnelian, jasper, steatite, socketed and tanged arrowheads of bone, points, pottery discs, etc. Terracotta beads decorated with incised designs are common to both Khairadih and Sohagaura. At Khairadih the use of glass is attested by the presence of a micro bead of blue glass (Singh 1992: 79), while at Narhan a polished celt is reported (Singh 1994, pl. XXIX). The presence of a socketed copper arrowhead, an indeterminate object, a coin, a rod and a copper piece respectively found at Khairadih, Narhan and Sohagaura suggests the scarce use of the metal. A noteworthy point which needs our attention is the complete absence of lithic tools at most of these sites which is considered an essential Chalcolithic appellation (Singh 1992: 79).

Tokwa

This important archaeological site is situated on the confluence of the Belan and Adwa in Lalganj sub-division of Mirzapur district of Uttar Pradesh at a distance of 68 km from Mirzapur city in south-eastern direction and at a distance of 8 km east of Baraundha. It is one of the well-preserved settlements among the Neolithic sites of the Vindhyas.

The northern margin of the site is flanked by the Belan river while the southern is facing the Adwa. The western margin of the site looks like the peak of a triangle. This site is quite extensive. Even at present it covers an area of about 27579 sq m or 6 hectares extending 400 m along the Belan and Adwa with a width of 150 m in the eastern side. As one moves eastward the width of the site gets widened. The eastern limit of the site is up to the present day village Tokwa. For the sake of convenience the entire site was divided into three sub-parts: Tokwa-1, Tokwa-2 and Tokwa-3 from west to east.

Though the site was discovered long back in seventies of the last century, it was revisited in 1999 and extensive explorations were done (Misra *et al*. 2000). Excavation conducted at the site during 2000 and 2002 has revealed cultural relics of Neolithic, Chalcolithic and Early Iron Age periods. The explorations at Tokwa resulted in the discovery of handmade pottery comprising cord-impressed, rusticated, burnished red, burnished black, black-and-red and ordinary red wares, on the one hand and black slipped ware, black-and-red ware on the other. The second assemblage of the pottery is wheel thrown. At Tokwa-1 two trenches H-8 and H-9 in 2000 and two I-8 and I-9 in 2003, each measuring 5 sq m were laid out. The combined testimony of the excavations brought to light the archaeological evidence of three cultures: Neolithic, Chalcolithic and Iron Age. The occupational strata, divisible into as many as 16 layers, measured 4.00 m.

Layers 8 to 16 measuring 2.47 m represent the Neolithic horizon at the site. These layers have yielded cord impressed pottery. Rusticated ware and burnished red and burnished black sherds as well. Other antiquities of the period include bone arrowheads, beads fashioned on semi-precious stones and terracotta, fragments of querns, mullers, hammer stones, etc. Microliths fashioned on semi-precious stones include flakes, flake fragments, blades, blade fragments, scrapers, triangles, etc. Preliminary observation to identify the grains obtained by floatation include rice, barley, *til*, *moong*. Some fruits and beans were also found. The analysis and identification of animal species is under process. The bones include both wild and domesticated animals. From excavation at Tokwa it appears that there was a gap between the disappearance of the Neolithic culture and arrival of the Chalcolithic culture as these two cultures exhibit different trades in ceramic tradition. While Neolithic pottery is handmade the Chalcolithic is wheel thrown.

Commenting upon the beginning of agriculture in the north-central India, Prof. V.D. Misra writes:

Recent study of Emma Harvey and Dorian Fuller (Harvey *et al*. 2005: 329-34) of the botanical material of Koldihwa and Mahagara have thrown welcome light on the range of cereals cultivated by the Neolithic people of north-central India. Crops identified at Koldihwa and Mahagara included rice, barley, wheat, pulses, sesame and small millets. The available evidence suggests that both at Koldihwa and Mahagara wild and cultivated varieties of rice and small millets were used from the beginning of Neolithic settlements. Barley, wheat, pulses and sesame were introduced at these sites subsequently. At Tokwa, Dr. Saraswat tentatively has come to a similar conclusion. He has identified rice, wheat, barley, green gram, lentil and small millets (personal communication). According to this preliminary observation, the Neolithic people were cultivating rice and small millets in the beginning but with the passage of time they also started cultivating barley, wheat, green gram, lentil, etc. Supportive evidence has also been obtained from Senuwar in Rohtas district in Bihar (Singh 2001: 109-118). The Neolithic deposit at the site is divided into two sub-groups: IA and IB. From the lowest part of the middle of period IA only grains of cultivated rice (*Oryza sativa*) were found. But along with this they were also using wild plants like jobs tear, fox tail/bandra, wild rice, *jharberi*, *chaulai* and wild *palaka*. But in the later phase of IA there appears to have been shift in the economy with the introduction of new cereals like barley, wheat, *jowar*, millet, lentil, field pea, finger millet/ragi and *khesari*. The available evidence suggests that by the late phase of the Neolithic culture, these cereals had started playing a major role in the life of the Neolithic people.

Remains of wild rice were also found embedded in the burnt clay lumps with reed impression. The presence of wild rice, however, when viewed in the context of the presence of food processing equipments and other traits of semi-sedentary settlements would suggest the collection of wild rice during this phase. Collection of wild rice during the late Mesolithic phase and the cultivation of *Oryza sativa* in the Neolithic phase also indicated a transition from gathering to cultivation.

Out of six excavated sites of the area under discussion, four have provided ^{14}C dates. These sites include Koldihwa, Mahagara, Kunjhun and Tokwa. From Koldihwa three dates reading 4530±185 BC, 5440±240 BC and 6570±210 BC have been obtained (Possehl and Rissman 1992: 461). Mahagara has yielded six dates, two thermo luminescent and four ^{14}C dates. The TL dates read 2265 and 1616 BC. The ^{14}C dates read 1400±150 BC, 1440±100 BC and 1480±110 BC (Possehl and Rissman 1992:461). Three calibrated dates from Kunjhun river-face read 1565-1265, 2665-2675-2575 and 3530-3335 BC (Possehl and Rissman 1992: 473-74). In the light of these dates Possehl and Rissman have proposed a time-bracket of 4000 to 1200 BC for the Neolithic culture of the north-central India. But if the dates of Koldihwa area taken into consideration the antiquity of the culture concerned would be pushed to 7th millennium BC. Recently three relevant ^{14}C dates have been obtained from two sites of the mid-Ganga valley. From the Neolithic horizon of Jhusi on the confluence of the Ganga-Yamuna in Allahabad three ^{14}C dates have been obtained. These dates when calibrated read 7477 BC (BS-2526), 5837 BC (BS-2524) and 6196 BC (BS-2525). The earliest date obtained from the site would put the beginning of the Neolithic culture of the site in 8th millennium BC. Lahuradeva (Tewari *et al*. 2003: 55-56), a multi-cultural site in Sant Kabir Nagar, has also furnished datable materials for ^{14}C dates for measuring the antiquity of the Neolithic horizon of the site. Two ^{14}C dares read 5320±90 BP (Cal. BC 4220, 4196 and 4161) and 6290±160 BP (Cal. BC 5298). An AMS ^{14}C date for carbonized domesticated rice would push the antiquity of the Neolithic culture at the site in 7th millennium BC (Tewari *et al*. 2005: 40).

The combined testimony of the available ^{14}C dates obtained from Koldihwa and Tokwa in the north-central India and Jhusi and Lahuradeva in the middle Ganga plain would push the antiquity of the Neolithic culture and *inter alia* of the beginning of agriculture in the north-central India and the middle Ganga plain around 8th millennium BC.

BIBLIOGRAPHY

Agrawal, D.P. and J.S. Kharakwal 2002. *South Asian Prehistory: A Multidisciplinary Study*. New Delhi: Aryan Books International.

Harvey, E.L., D. Fuller, J.N. Pal and M.C. Gupta 2005. Early Agriculture of the Neolithic Vindhyas (North-Central India). In *South Asian Archaeology, 2003*. Ute Rrank Vogt and Hans- Joachim Weisshaar (eds.).

Jarrige, J.F. 1985. Continuity and Change in the North Kachi Plain (Baluchistan, Pakistan) at the Beginning of the Second Millennium BC. In *South Asian Archaeology 1983*. J. Schotsmans and M. Taddei (eds.): 35-68. Naples: Istituto Universitario Orientale.

Jarrige, J.F. and M. Lechevallier 1979. Excavations at Mehrgarh, Baluchistan: Their Significance in the Prehistorical context of the Indo – Pakistan Border Lands. *South Asian Archaeology* 1977. M. Taddei (ed.): 463-536. Naples: Istituto Universitario Orientale.

Jarrige, J.F. and Richard H. Meadow 1980. The Antecedents of Civilization in the Indus Valley. *Scientific American* 243 (2): 122-133.

Misra, B.B. 1989. Chopani Mando. In *Encyclopedia of Indian Archaeology*. A. Ghosh (ed.). New Delhi: Munshiram Manoharlal.

Misra, V.D. 1997. The Mesolithic Cultures of the Vindhyas and the Ganga Valley with Special Reference to Environment and Archaeology, *Him-Kanti* (Prof. K.P. Nautiyal Felicitation Volume). B.M. Khanduri and Vinod Nautiyal (eds.): 41-42. Delhi: Book India Publishing Co.

Misra, V.D. 2007. Stone Age Cultures, Their Chronology and Beginning of Agriculture in North Central India. *Man and Environment* 32 (1): 1-14.

Misra, V.D. and M.C. Gupta 1995. Pre-NBPW Cultures in the Mid-Ganga Valley. In *Prof. Agam Prasad Mathur Felicitation Volume Vol. III*. R.P. Verma *et al.* (eds.): 21-34. Agra: Hazuri Bhavan.

Misra, V.D., B.B. Misra, J.N. Pal and M.C. Gupta 2000. Explorations at Tokwa: A Neolithic-Chalcolithic Settlement on the Confluence of the Belan and Adwa rivers. In *Peeping Through the Past* (Prof. G. R. Sharma Memorial Volumes). S.C. Bhattacharya, V.D. Misra, J.N. Pandey and J.N. Pal. (eds.): 45-57. Allahabad: University of Allahabad.

Pal, J.N. 1990. The Early Farming Culture of the Northern Vindhyas. *Bulletin of the Deccan College Post-graduate and Research Institute* 49: 297-310.

Possehl, G.L. and P.C. Rissman 1992. The Chronology of Prehistoric India: From Earliest Times to the Iron Age. In *Chronologies in the Old World Archaeology*. Vol. II, India. Robert W. Ehrich (ed.): 461. Chicago and London: The University of Chicago Press.

Sharma, G.R., V.D. Misra, D. Mandal and J.N. Pal 1980. *Beginnings of Agriculture*. Allahabad: Abinash Prakashan.

Sheffer, J.G. 1992. Indus Valley, Baluchistan and Helmand Traditions: Neolithic Through Bronze Age. *Chronologies in the Old World Archaeology*, Vol. I. (third edition). Robert W. Ehrich (ed.): 441-464. Chicago and London: The University of Chicago Press.

Singh, B.P. 2001. Stages of Cultural Development in the Middle Ganga Plain – A Case Study of Senuwar. *Pragdhara* 11: 109-118.

Singh, P. 1992. Neolithic-Chalcolithic Cultures of Eastern U.P. In *Archaeological Perspectives of Uttar Pradesh and Future Prospects*, Part-I. Rakesh Tewari (ed.): 67-76. Lucknow: U.P. State Archaeological Organisation.

Singh, P. 1994. *Excavations at Narhan (1984-89)*. Varanasi and Delhi: Banaras Hindu University and B.R. Publishing Corporation.

Tewari, Rakesh, R.K. Srivastava, K.K. Singh, K.S. Saraswat and I.B. Singh 2003. Preliminary Report of the Excavations at Lahuradeva, District Sant Kabir Nagar, U.P. 2001-2002: Wider Archaeological Implications. *Pragdhara* 13: 37-68.

Tewari, Rakesh, R.K. Srivastava, K.K. Singh, Ram Vinay, Rajiv Kumar Trivedi and G.C. Singh 2005. Recently Excavated Sites in the Ganga Plain and North Vindhyas: Some Observations Regarding the Pre-Urban Context. *Pragdhara* 15: 39-50.

Yasuda, Yoshinori 2002. *The Origins of Pottery and Agriculture*. New Delhi: Roli Books.

AJAY PRATAP

Exploring the Highlands South of Ganga Valley: The Case of Rajmahal Hills, Santhal Parganas, Jharkhand

Introduction

The purpose of this paper is to discuss the archaeological finds from the Rajmahal Hills, Santhal Parganas district, Jharkhand, and to argue that the Shifting Cultivation hypothesis fits this data. That being the primary purpose of this paper, in the context of this book, we would also try to draw a broad implication arising from the work discussed in this paper that the archaeology of the Ganges Civilization is presently couched in very colonial framework of considering the Ganges Civilization as only including the plains of the Ganga area. Why have we drawn such a demarcation? Quite obviously the plains area and the highlands south of it have both complemented each other in various ways from the pre-history to the present. For example the evidence relating to iron-working sites in Bihar and Jharkhand point very clearly to the development of this technology in Chotanagpur (the Asura sites) and in the Ganga valley to such sites as located at Urain (Bihar). It is commonsense that most of the ores of iron are to be found in lateritic hills, whether these are the Rajmahal Hills or the plateaus of Chotanagpur. Thus, a complimentary relationship between the archaeological sites of the plains around the Ganga river and the Highlands South of it may easily be predicated. The same logic holds true for many crop species that were definitely domesticated in the highland areas first and would then have found their way into the Ganga Valley Civilization.

The archaeology of shifting cultivation is a very vexing issue. The world over we have evidence for beginnings of agriculture and in many places this is termed as "Incipient Agriculture", an agriculture preceding settled plough cultivation. Where the geographical factors are suitable, very often, this incipient agriculture is termed as shifting cultivation. However, the requirement for the practice of shifting cultivation is very terrain specific; slope and rainfall must also be all right. Hence, in many cases where this hypothesis has been advanced there is a lack of fit between the hypothesis and the data. For example, Chirand in Bihar and in places in the North-West (Mehrgarh) and Rajasthan, where fire clearance has been suggested are all grasslands or desert areas in which a shifting cultivation economy is not imaginable. These are the reasons why the shifting cultivation hypothesis can be applied only in selected areas. In India, from time to time, the claim for shifting cultivation is made in areas like the North-East, Bihar, Orissa and other states where the natural factors and slope requirement is satisfied and there are the ethnographic instances of SC* being practiced. Here archaeological materials occur in forested zones. These together comprise tropical or sub tropical areas, hence there is the presence of high annual rainfall, which is important for shifting cultivation. The purpose of this paper is to discuss the archaeological finds from Santhal Parganas district, Bihar found in the Rajmahal Hills and to argue that the Shifting Cultivation hypothesis fits this data.

The Rajmahal Industry

During a reconnaissance survey in the plateau regions of the Rajmahal Hills in 1981-82 and 1983-84 a number of archaeological finds were made. My Rajmahal survey was done virtually single handed and hence there were several limitations. Non-availability of aerial photographs or good maps was also a hindrance. I divided the survey area into three units in which Zone I covered the foot hills, Zone II the gradient from the crest to the bottom of the foot hills. Within the zones walking was done most intensively along the main drainage channels. By December 1981, Zone II had already revealed one cluster and one individual artifact. In September 1983 in the course of surveying Zone III which lies across the central plateau of the study area two clusters of artifacts were located. They were both on the drainage lines one of the most important perennial hill streams. In the same year Zone I yielded several individual artifacts. These finds are distinguishable as following sites.

RJM1 Baragutibera

This site is located about 11 km from the village of Baragutibera (the base camp for this survey. Artifacts are spread over 50 m x 70 m area and some of these are disturbed by ploughing.

---

* Since the term shifting cultivation will be used very often we shall refer to it as SC.

The density of artifacts here is 7.6 per metre. The lithics here total 613, comprising 357 implements and 256 simple artifacts. Implements include simple and worked blades, three types of points Axes/Adzes and flake tools. Simple artifacts include cores (fluted, flake) nodules and debitage.

RJM2 Pachrukhi

This site is located 500 m from the village Pachrukhi and 50 m from Beddo Nadi a local perennial stream. This site is about 5 km from RJM1. Here the site size is about 100 x 50 m although some of this dispersal may have been on account of ploughing. The lithics at RJM2 comprise a total of 222 artifacts divisible into implements (91) and simple artifacts (131). Implements include simple and worked blades, simple and worked points scrapers, borers, Axes/Adzes and flakes of various kinds. Simple artifacts include fluted cores and debitage. There is the presence of a small mound here, which holds promise for archaeological materials if excavated.

RJM3 Chaldehi

This site is located 5 km downstream from RJM2. This is a predominantly microlithic site but locationally similar to the other two sites. This site is about a 100 m from a hill stream and is not disturbed by ploughing. The artifact scatter here is 10 m x 5 m and artifacts here are typologically comparable to the other two sites. The artifact density here is 15.6 p.m^2. A total of 476 artifacts occur here divisible into implements (192) and simple artifacts (284). Blades here are the highest (89), which is 19% of the total site. Other artifacts occurring are points, scrapers, borers drills, lunates and triangles. Simple flakes account for about 47 or 9.9 % of the site total. Simple artifacts comprise 284, which is 59.7% of the site total. As a matter of facts these finds were the first ever to be made in the uplands of Rajmahal Hills and given the constraints of time no further surveys could be conducted to find more data. I have already given a description of the types found in my survey it remains to conclude whether these represent Shifting Cultivation or not.

Historical Analogy

There is a large debate in archaeology about the use of models and analogy (Hodder 1982, Schrire 1980, Kramer 1979, Wylie 1986) to explain archaeological phenomenon. However, it is today equally widely agreed that analogies work best in historically continuous situations. The Rajmahal is definitely an area where the historical analogy may be used. The Paharia people who live here today, and have done so since times immemorial, are shifting cultivators. Although their present tool kits consist of wood and bamboo in large measure these are complimented by iron counterparts and iron predominate their tool kit: spears, bows and arrows, *hansua* (sickle) and *Jugri* (digging stick). However, in this paper we shall develop prediction for site location and assemblage variability in the Rajmahal Hills, on the basis of historical ethnography of Paharia settlement and technology. The analogy we shall posit will be a relational analogy in which we shall link the Paharia past with the present on account of mobility consideration.

18th and 19th Century Paharia

At the time of the arrival of the British East India Company, the Paharia lived in the hills largely by their own will. Their practice of *Khallu* (or shifting cultivation) was not in the absence of knowledge of plough cultivation. Khallu was their chosen mode of subsistence. The cultivars featuring in Khallu were seed crops, root crops and cash crops, SC was polycultural and in seed crops there was also polyvariety. Five varieties of millets, pulses, maize and barley were sown together on the same plot with the help of iron tipped, or pure wood digging sticks. Two types of yams were raised in gardens near homes while two were gathered from the forest. A number of wild plants and fruits were also utilized. The protein requirement of diet was met by hunting and animal domestication. Wild pig, deer, porcupines, rabbits and a number of birds were hunted. The SC itself was based on fallows of 8-10 years. The agricultural calendar started from June and ended between October-December. There is not much information regarding settlement but it is certain the villages were sedentary, expanding only when lineages segmented and established *tolas* or hamlets near the parent settlement. In the 19th century the face of Santhal Parganas was to be changed by the huge influx of Santhals from southern areas who were plough cultivators and cleared a lot of lowland as well as some upland jungles.

There is in the 19th century a confirmation of the settlement pattern noted in the previous century of parent villages and single family crop tending locations. Colonel Francklin a traveller who visited the hills, prior to Santhal immigration noted: "Each plantation has a hut adjoining …. each hut close to the field contains but one family for the purpose of watching the crops at night against the incursions of wild hogs and deer" (Francklin 1821: 4). Paharia houses were "very clean and comfortable and far superior to those of the lowlanders". The structures were made exclusively from reeds and wooden pillars tied together with vines and bark. Paharia SC and settlements in the hills occupied an area of 35,840 acres. A total of 921 villages, 6,756 houses and 33,780 individuals were estimated (Sherwill 1852: 604).

The Present

In the present there are direct continuities observable from the economic pattern whose origin in the 18th and 19th century was discussed. Today there is a lack of mature forests which would sustain long fallows. At the household level economic strategies have diversified. All the resources have become localized around the villages. However, for SC or exploitation of resources other than Khallu, wild vegetal foods are there. There is no evidence for residential mobility nor "ranging or encounter type foraging or collection" suggested by Binford (1980).

Tools

The basic tool repertoire of the Paharia is wood and bamboo even if iron also finds a place. Iron was introduced in the Ganga valley in 10th century BC and, therefore, it would be difficult to find modern evidence for stone tool use or manufacture. However, P.O. Bodding (1904) noted that Santhals used large stone flakes to fell immature trees. Basically it may be noted that some of the tools are meant for home base use *chakki, ukhali samath, kutchi* (steel knife) and there are several tools for forest based activities like *masu, tatro, katchia, jugri, bansula, bhala, kudali, orra abro, khurpi, lathi and gurdel*. Thus we may divide the tool repertoire into non-mobile and mobile tools.

The Process of Khallu (Shifting Cultivation)

Khallu yields only a single harvest per year. However, the agricultural calendar from June to December is basically extant still, Khallu continues to be a polycultural system and a variety of crops are taken although there may be a variation in output between wet and dry year. For instance in a wet year a yield of 226.5 kg of maize (from a one acre plot) may be expected but in a dry year only 133 kg output is estimated. Although the coming of iron makes for a break in the continuity of tool use, however, we may strengthen our analogy by contemplating the mobility considerations (regarding settlements and tools). Basically the growth cycle of settlements are three staged (Fig. 1). The parent family fissions at the time of marriage and a new unit established nearby is called *Tola*. The next settlement unit is Khalkuria which is a single family residence near the fields for the purpose of watching growing crops. Thus, *Bera*, *Tola* and *Khalkuria* are the three settlement units. Of course in time *Tolas* may grow to become *Beras*.

Settlement Growth and Human Mobility

As for individual mobility these are of several types. We have argued in the beginning of this paper that a historically continuous analogy may be applied in the Rajmahal Hills. We have already demonstrated that continuity in Paharia society is characterized by sedentary settlements and high individual mobility. Human mobility was itself divisible into yearly (kin visits), weekly (visits to markets) and diurnal (Khallu plots, hunting, fishing, trapping). A high degree of mobility is present in August-October period when crops are being watched. Mobility was also related with collecting wild fruits and foods. In the past group hunts were practiced but owing to decline in game this is now restricted. All hunting and trapping of small game is done on an individual basis.

Archaeological Predictions

Basing on the nature of Paharia Khallu which requires sedentary settlements and high individual mobility the following sections discuss how we may predict archaeological material

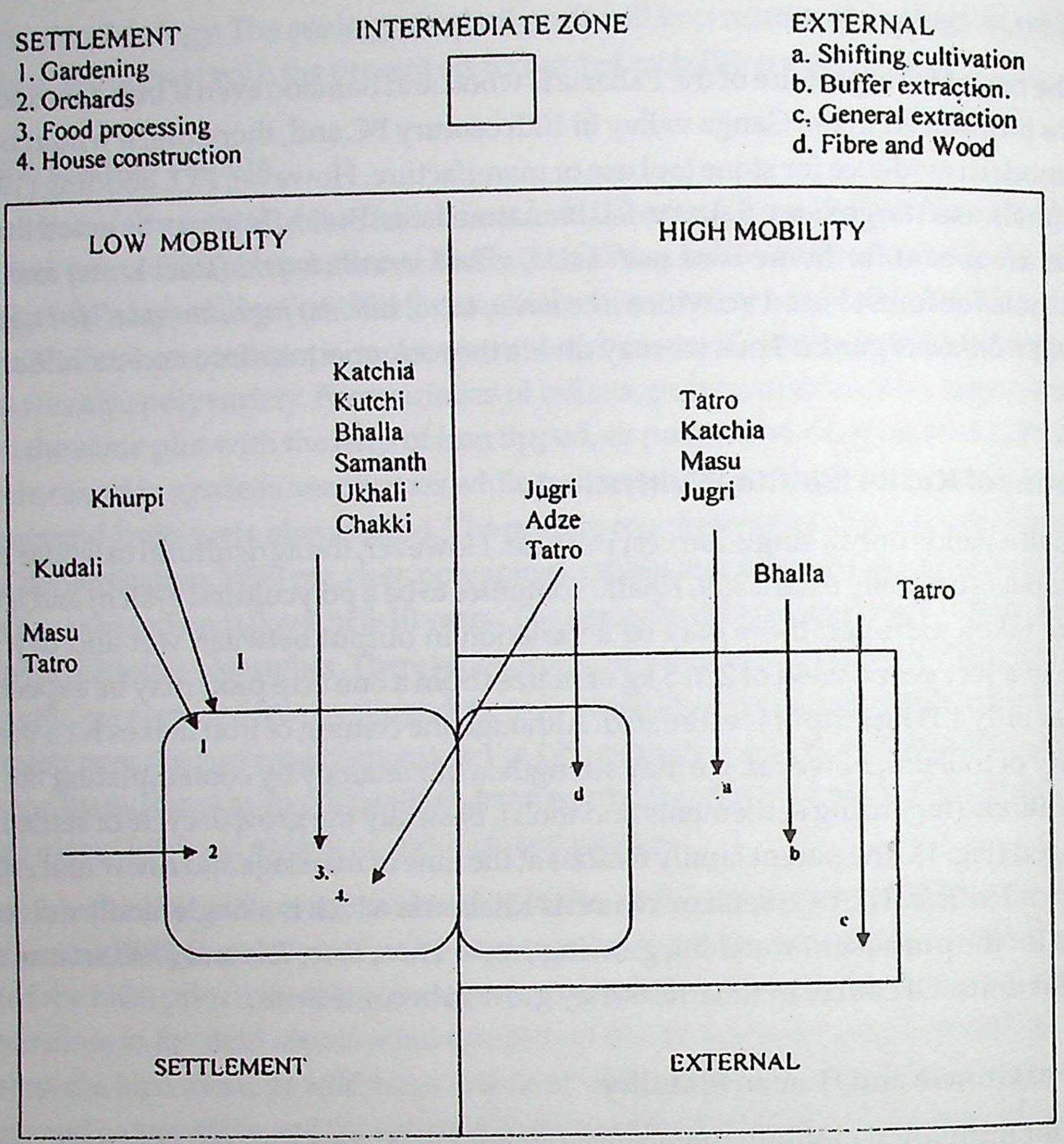

SETTLEMENT
1. Gardening
2. Orchards
3. Food processing
4. House construction
INTERMEDIATE ZONE
EXTERNAL
a. Shifting cultivation
b. Buffer extraction.
c. General extraction
d. Fibre and Wood
LOW MOBILITY
HIGH MOBILITY
Katchia
Kutchi
Bhalla
Samanth
Ukhali
Chakki
Khurpi
Kudali
Masu
Tatro
I
Jugri
Adze
Tatro
Tatro
Katchia
Masu
Jugri
Bhalla
Tatro
1
2
3.
4.
d
a
b
c
SETTLEMENT
EXTERNAL

Fig. 1. Spatial contexts of Paharia tool-use

in the Rajmahal Hills. The basic relevance of settlement location (discussed by Higgs and Vita Finzi 1972, Hill 1969, Ammerman and Cavalli Sforza 1971, Waddell 1972, Morren 1986 and Rafferty 1985) for archaeology of SC lies in the fact that the patterns of site location and assemblage variability may be assumed to be directly or indirectly influenced by movement related decisions of pre-historic people. That is, if the composition and distributional aspects of the archaeological data correspond to the patterns of mobility (settlement or individual) predicted in the model, the economy producing the archaeological material may be said to be the same or strongly analogous. In the Rajmahal context owing to a tropical regime there is not a great development of the soil profile. In many areas laterites predominate and the top soil is very thin. This poses a particular problem for the formation of mounds and strata from pre-historic settlement location.

However, even if settlements are difficult to locate in the Rajmahal environment it may be said that we cannot rule out, given the local topography, that even in pre-history SC settlements may have been sedentary. This is to say there would have been the rotation only of cultivation plots. Again even if we hold it globally valid that settlements in SC are of mobile type there has not been a single excavation where we could say unequivocally that a mobile type of SC settlement was found. Contrarily it has been shown ethnographically by (Carniero 1960) study that Kuikuru settlement pattern is also sedentary. If new settlements are created this is due to social reasons and not due to agricultural contingencies.

Settlement and Technology: The Diagnostic Indicators

As for the settlement pattern in the Rajmahal context we may predict only sedentary bases in the archaeological record since the terrain there does not permit settlement location except in a few flat land and valleys of the hills. We may expect debris accumulation near settlement bases but not at crop-tending huts or caused by individual mobility which is very high. Thus we may predict site location at a conjunction of valleys, proximity to streams, and availability of slope for cultivation, foot-tracks and forest. Having said this it must be added that given the tropical climate and forest felling much soil gets washed away and destruction of settlement type sites is inevitable.

As for tools the following predictions may be made although in the Rajmahal case we are developing the predictions from iron tools. Some such as Binford (1966) have divided tools as maintenance and extractive. However, we have noticed that among the Paharia the actual use of some tools is fairly random. They can be grouped better according to the spatial contexts of their use. These spatial contexts range from the settlement to the forest and each tool is by turns for maintenance as well as extractive us. Thus, we may group the tools as:

1. Greatest mobility tools used for plot related functions and these are functionally the most diverse.

2. Least mobility tools used for food processing (home base) and these are functionally restricted.

3. A dual mobility is associated with some tools for extraction and these tools are both function specific (metal adze) as well as diverse (heavy sickle or tatro).

Predictions for Rajmahal Survey

We have now in turn amply discussed settlement and technology of the Paharia. On this basis the following chart of predictions may be posited.

Diagnostic Traits of Sedentary Shifting Cultivation

Site types	*Location*	*Site Features*	*Artifacts*
Settlements	Valley floor or tablelands, near streams and cultivable slopes	High visibility, High density and definition of activities	High and low mobility artifacts
Crop tending locations	Slopes, in the vicinity of settlements	Poor visibility & lower density of artifacts	High mobility artifacts
Individual mobility locations	Random	Poor visibility, individual artifacts	High mobility artifacts

The Survey Findings: Shifting Cultivation or not?

We have already argued before that it is not necessary that there be tools typical of any particular agricultural system. Complex agricultural tasks may be carried out by very simple technology. Rather it is the particular geographical, ecological and historical context which suggests what type of economy may have existed in the past. We shall argue that the Rajmahal finds do in all probability suggest shifting cultivation. As a summary of the data found it may be said that they are predominantly lithic material. There is no direct evidence by way of walls, floors stone circles or any type of structure. Of the 9 artifactual finds thus discovered 6 were single artifacts and the remaining three, clusters of flint artifacts. The artifacts found are themselves quite serviceable in agricultural contexts. This assemblage consisting of implements and simple artifacts totals 1311 artifacts with ample evidence at each site (RJM 1, 2, 3) of stone tool manufacture. Rajmahal industry and the ratio of implements to debitage at each of the three sites bears ample testimony to this hypothesis being correct. Also there is as corroborative evidence the presence of fluted cores as evidence of on-site tool manufacture. Locationally, RJM 1, 2, 3 are all near hill streams and good slopes so that it may be said that they could be settlement sites. The single artifact finds are all random and it may be hypothesized they were lost or discarded in journeys made by individuals.

Rajmahal Industry: Site and Typewise Distribution

Implements	*RJM1*	*% of site total*	*RJM2*	*% of site total*	*RJM3*	*% of site total*	*Total*	*Total %*
Simple Blades	27	4.4	27	12.2	67	14.1	121	9.2
Worked Blades	22	3.6	2	0.9	22	4.6	46	3.5
Simple Point	13	2.3	6	2.7	27	5.7	46	3.5

contd.

Implements	*RJM1*	*% of site total*	*RJM2*	*% of site total*	*RJM3*	*% of site total*	*Total*	*Total %*
Worked Point	3	0.5	2	0.9	3	0.6	8	0.6
Shouldered Point	1	0.2	0		0		1	0.1
Scrapers	25	3.9	4	1.8	5	1	34	2.6
Borers	1	0.2	4	1.8	6	1.3	11	0.8
Axe/Adze	2	0.3	1	0.5	0		3	0.2
Chisel	1	0.2	0		0		1	0.1
Knife	1	0.2	1	0.5	0		2	0.2
Drills	0		0		3	0.6	3	0.2
Lunates	0		1	0.5	4	0.8	5	0.4
Triangles	0		0		8	1.7	8	0.6
Simple Flakes	259	42.2	35	15.8	47	9.9	341	26
Pointed Flakes	0		8	3.6	0		8	0.6
Levallois Flakes	2	0.3	0		0		2	0.2
Total	357	58.3	91	41.1	192	40.3	640	48.8
Simple Artifacts								
Fluted Cores	7	1.6	7	4.1	15	3.2	29	2.2
Flake Cores	3	0.5	2	1.5	0		5	0.4
Rejuv. Flake	4	0.6	0		6	1.3	10	0.6
Nodules	13	2.1	0		12	2.5	25	1.9
Debitage	229	37.4	122	54.8	251	52.7	602	45.9
Total	256	41.7	131	58.9	284	59.7	671	51.2
Grand Total	613	100	222	100	476	100	1311	100

Conclusion

In this paper we have tried to present some material which has been recovered by surface survey. The methodology adopted was to make predictions about site types, features and assemblage composition and variability. These predictions were themselves based on an analogy with the historically recoverable Paharia settlement and technology data which we argued is comparably well extant even now. The predictions worked since artifacts and assemblages were found in the Rajmahals. This also strengthens the propensity of the accuracy of historical analogy in areas where subsistence strategies have some antiquity. Lastly, if such hills as the Rajmahal were populated in pre-historic times we must begin to look for evidence of feedback relationships between pre-historic cultures of plains areas of the Ganges valley and the southern highlands.

BIBLIOGRAPHY

Allchin, F.R. 1962. The Neolithic Stone Industry of the Santhal Parganas. *Bulletin of the School of Oriental and African Studies* 25 (2): 306-30.

Ammerman, A.J and L.L. Cavalli Sforza 1973. A Population Model for the Dispersion of Early Farming in Europe. In *The Explanation of Culture Change*. C. Renfrew (ed.). London: Duckworth.

Binford, L.R. 1966. A Preliminary Analysis of Functional Variability in the Mousterian of the Levallois Facies. *American Anthropologist* (special publication) 68 (2): 238-95.

Binford, L.R. 1980. Willow Smoke and Dogs' Tails: Hunter-gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity* 45: 4-20.

Bodding, P.O. 1904. Shouldered Headed and Other Forms of Stone Implements in the Santhal Parganas. *Journal of the Asiatic Society of Bengal* 32 (1): 27-30.

Carniero, R.L. 1960. Slash and Burn Agriculture: A Closer Look at its Implications for Settlement Patterns. In *Men and Cultures*, A.F.C. Wallace (ed.). Philadelphia.

Chakrabarti, D.K. 1993. *Archaeology of Eastern India*. New Delhi: Munshiram Manoharlal Publishers Pvt. Ltd.

Chakrabarti, D.K. 1997. *India: An Archaeological History*. New Delhi: Oxford University Press.

Ebert, I. 1979. An Ethnoarchaeological Approach to Reassessing the Meaning of Variability in Stone Tool Assemblages. In *Ethnoarchaeological Implications of Ethnography for Archaeology*. C. Kramer (ed.) New York: Columbia University Press.

Eder, J.F. 1984. The Impact of Subsistence Change on Mobility and Settlement Pattern in Tropical Rain Forest Foraging Economy: Some Implications for Archaeology. *American Anthropologist* 86: 837-853.

Francklin, W. 1821. A Journey from Bhagalpur through the Rajmahal Hills in the months of December and Janaury 1820-21. Calcutta Annual Register.

Glover, I.C. 1971. Prehistoric Research in Timor. In *Aboriginal Man and Environment in Australia*. Mulvaney and Golson (eds.). Canberra: A.N.U. Press.

Golson, J. 1974. Recent Discoveries in the New Guinea Highlands: Simple Tools and Complex Technology. *MSS*, Haddon Library, Cambridge.

Higgs, E.S and Vita-Finzi C. 1972. Prehistoric Economies: A Territorial Approach. In *Papers in Economic Prehistory*. E.S. Higgs (ed.). Cambridge: Cambridge University Press.

Hodder, I. 1982. *The Present Past: An Introduction to Anthropology for the Archaeologist*. London: Batsford.

Hodder, I. 1987. *Reading the Past*. Cambridge: Cambridge University-Press.

Iversen, J. 1941. Land Occupation in Denmarks Stone Age. Danmarks Geologiske Undersogelse II Raekke 66: 1-68.

Joshi, R.V. 1968. Late Neolithic Cultures in Central India. *La Prehistorie: Problems et tendencies.* Paris.

Kramer, C. (ed.) 1979. In *Ethnoarchaeological Implications of Ethnography for Archaeology*. New York: Columbia University Press.

Majumdar, G. and S.N. Rajaguru 1985. Investigations of the Pleistocene Sediments from the Belan Valley, U.P. In *Studies in Indian Archaeology (Prof. Sankalia Felicitation Volume)*. S.B. Deo and M.K. Dhavalikar (eds.): 96-105. Bombay: Popular Prakashan.

Morren, G.E.B. 1986. The Miyanmin. Ann Arbor. UMI Research Press.

Oldham, C.E.A.W. 1930. *Journal of Francis Buchanan*, Kept during the Survey of the district of Bhagalpur in 1810-11. Patna: Superintendent Government Printing.

Pratap, A. 1987. Savariya Paharia: Shifting Cultivators of the Rajmahal Hills, India. In *Archaeology as Long-term History*. I. Hodder (ed.). Cambridge: Cambridge University Press.

Pratap, A. 2000. The Hoe and the Axe: Ethnohistory of Shifting Cultivation in Eastern India. New Delhi: Oxford University Press.

Rafferty, J. 1985. The Archaeological Record of Sedentariness: Recognition, Development and Implications. Schiffer, M.B. (ed.). Advances in Archaeological Method and Theory, Vol. 8. New York: Academic Press.

Sali, S.A. 1985. Upper Palaeolithic Culture at Patna, Distt. Jalgaon, Maharashtra. In *Recent Advances in Indo-Pacific Prehistory*. V.N. Misra and P. Bellwood (eds.): 137-146. New Delhi: Oxford and IBH.

Schrire, C. 1980. An Enquiry into the Evolutionary Status of the San Hunter-gatherers. *Human Ecology* 8: 9-32.

Sherwill, Col. T. 1852. A Tour through the Rajmahal Hills. *Journal of the Asiatic Society of Bengal* 20: 544-606.

Smith, P.E.L and T.C. Young 1972. The Evolution of Early Agriculture and Culture in greater Mesopotamia: A Trial Model. In *Population Growth: Anthropological Implications*. B. Spooner (ed.). Cambridge: Mass, M.I.T. Press.

Waddell, E. 1972. The Mound Builders: Agricultural Practices, Environment and Society in the Central Highlands of New Guinea. *American Ethnological Society, Monograph 53*. Seattle: University of Washington Press.

White, J.P. and N. Modjeska 1978. Acquirers, Users, Finders, Losers: The Use of Axe Blades among the Duna. *Mankind* 11: 276-87.

White, J.P. 1972. Ol Tumbuna: Archaeological Excavation in the Eastern Highlands of Papua New Guinea, *Terra Australis* 2. Canberra: The Australian National University Research School of Pacific Studies.

Wylie, A. 1986. The Reaction Against Analogy. In *Advances in Archaeological Method and Theory*, Vol. 8. M.B. Schiffer (ed.). New York: Academic Press.

D.P. SHARMA, MADHURI SHARMA & AJIT KUMAR CHOUDHARY

New Copper Hoard in Upper Ganga Plain

Till today around 2000 copper hoard implements have been reported from India. The National Museum has 191 implements perhaps the largest collection in India. The new copper hoard objects which were reported till 1988 have been covered by D.P. Sharma (1987) and S.P. Gupta (1986) in his papers published in *Puratattva* 17 and 16. This paper deals with the new finds which were reported till 1991. Mr. Tarik Ahmad Chisti of Amroha, Moradabad collected 117 copper hoard implements for various localities of western U.P. which are described by the author elsewhere. Mr. Satish Jain of Meerut showed us 2 copper hoards which were collected near the ancient site of Hastinapur. These objects include one shoulder axe and a weed chisel.

This paper deals with the 54 implements which are now in the private collections in Allahabad and New Delhi. It was a dealer hailing form Nagavasuki in Allahabad who brought 34 copper hoard implements from the localities of the middle-Doab region. These objects include an anthropomorphic figure, a flat axe with tang, a copper chisel, 7 antennae swords, 2 bangles, 4 shoulder celts, 11 flat celts, 5 weed chisels and 2 harpoons. A dealer of Sundar Nagar, New Delhi, also showed us 20 copper hoard implements. However, the exact provenance of these remains unknown but it was told to me that these were collected from western U.P. This collection includes a spearhead, 4 shoulder celts, 6 flat celts, 5 antennae swords and 2 harpoons. A careful examination indicates that some of these implements are rare pieces (Illus. 1).

Anthropomorphic Figure (Illus. 3, 4, 12, 13, 14 and 15)

A typical piece of this collection is an anthropomorph. So far 20 anthropomorphic figures have been reported from 16 localities of Uttar Pradesh, Gujarat, Bihar and Lothal (Illus. 2). Anthropomorphic figure (Sr. No. 121, Acc. No. 88.17) 1989-90 collection bear long arms and short legs type, classified by D.P. Sharma (1987). Its right arm is partly broken and the left one curved back. The two legs are curved backward. The head of this figure is quite big and thick and its distance from joints of arms is mostly equal (Illus. 4). The top portion of the head is plano-convex with chisel striation marks on both sides. Thickness decreases from head towards the lower part of body. Both the side edges between arms and legs are concave. This figure bears green patina, and the object is peculiar in shape and differs slightly from the other anthropomorphic figures of copper hoard collection. For example, it does not have vertical chisel marks as are common on all such figures, discovered so far in India. The edge of head of other such figures is blunted backwards (Rimon head) whereas this is not found in this case. The cavity between the joints of two legs noticed in this figure is also not traceable. Technologically, this figure is crude and inferior as it was first cast and then hammered. This figure resembles the anthropomorphic figure from Bulandshahar (Gaur 1982) Saipai (Yule 1982) and Bisauli (Yule 1982) which are also of long arms and short leg type I (Illus. 3). In the Saipai object, the legs are straight whereas in this type the legs are of curved type. On the basis of parallel typology and shape, the provenance of this figure can be connected with middle Ganga-Yamuna Doab region of western Uttar Pradesh. Another anthropomorphic figure from Chandausi differs from it in shape and technology (Pant 1978: 50-57, plate V-12). The Chandausi figure is more refined with its straight legs and edge portion of head blunted backward depicting a vertical dash-mark over the whole body (Illus. 2).

The anthropomorphic figures of the copper hoard group indicate that these are typical 'cult' or 'auspicious' objects. It is interesting to note that the metal object of this shape and kind so far have not been found in any ancient Bronze Age Civilization of the world (Illus. 3). The anthropomorphic figure resembles the figure of anthropomorphic of *nandipada* (taurine symbol) and *nandivarta* which looks like *Ma* of ancient Brahmi script. We find the anthropomorphic taurine symbol right from the Indus valley period (*c.* 2700 BC) to early historic period 5th century AD (Madhuri Sharma 1989: 191) and also in later period. The Taurine figure of anthropomorphic form resembling copper-hoard implement was found in the necklace and earring of Yaksha's figure from Pitalkhora and Kausambi and Yaksha from Bharhut, all of which are dated around 2nd century BC to first century AD. *Gomukha Nandi mukha* shaped thin silver objects reported from Gungeria, district Balaghat, Madhya Pradesh, also have some resemblance with the anthropomorphic figure of copper. The Taurine symbol is an auspicious symbol and is frequently seen in anthropomorphic forms and Brahmi script. *Ma* type in art of early historic period of India in anthropomorphic form of copper hoard with fore-arms are curved whereas both the legs are either straight or curved; in Pitalkhora, Yaksha Taurine bead in necklace, arms are absent and legs are curved like copper hoard figure. The possibility of origin of anthropomorphic figure of copper hoard and the Taurine symbol form one symbol, *i.e.*, earth goddess (Vasundhara cannot be denied because the antiquity of the anthropomorphic Taurine symbol goes back very early period, *i.e.*, up to Harappan Period (2700 BC). This makes our view strong that the anthropomorphic figures of copper hoard and the anthropomorphic Taurine are linked with some cult of auspicious objects or good omen. These two reduce the effect of bad happening and the purpose of both figures was the same, *i.e.*, religious. Tiny anthropomorphic figures of metal are still worshipped on every Saturday in the form of Shani-god in northern India. The worshipper offers oil and coins on this metal Shani-god and they believe that by doing so this god will stall the effect of bad happenings. K.N. Dikshit (1986) has rightly suggested earlier this to be a cult object. The author feels that the anthropomorphic form looks more as an auspicious or *Mangal* object rather than a weapon. One group of scholars believes that this figure has been used as a missile. For example, D.P. Agarwal (1969) made reply of this object and he tried to show that this could also be used as a missile. The author and others are of the opinion that the use of such heavy object as a missile is practically not only difficult but inconvenient too. Secondly, invocation of such type of missile by copper hoard people was beyond the reach of their mind. Such types of missile have not been reported from any site of any contemporary old Bronze Age Civilization of the world. Krishna Kumar (1982) is of the view that this anthropomorphic figure was worshipped in the form of Vedic god Indra. In south-east India this figure was used by Santhals in symbolizing their ancestors (Allchin and Allchin 1982: 265).

Razor or Knife

This is a typical razor and appears like an axe with a tang. It is a new type of object in the copper hoard collection. It side edge is convex and sharp bearing some used marks. Its shape is rectangular and both the sides are flat, tapering towards a working edge. A flat bar-shaped rectangular tang attached near the butt-end is the peculiar feature of this implement. The tang makes a right angle near the joint. It also has a coating of green patina. This implement resembles in shape with the weapon of another razor which is now in the National Museum, New Delhi.

Spearhead (Illus. 1)

A spearhead (Sr. No. 163, Acc. No. 88, 85) is yet another peculiar object in a new shape. While its working edge is pointed middle portion is a thick long blade type with a quadrangular cross section. It is flat on all the four sides tapering towards a working point. There are two holes with a cylindrical butt end. According to the author such type of implements were called knives. This is identical in shape with the weapon from Rewari (Yule 1982).

Antennae Swords (Illus. 17, 18 and 19)

So far sixty antennae swords have been reported from seven localities of India. The National Museum, New Delhi has acquired twenty-eight objects from five localities of India. Fifteen antennae swords of 1990-91 collection are very interesting in typology.

An antennae sword (Sr. No. 159, Acc. No. 88, 81, 1-4) in four pieces has a long and pointed edge with a leaf like blade. The medial ridge of the blade is prominent and both its sides are convex. Both the side edges are also convex and they join each other at the pointed tip. It also bears use marks. The antennae of the swords are of a high angle and its two ends at long prongs are incurved. The two prongs make an angle of 135^0 in relation to the vertical axis of the blade, and they bifurcate diagonally with each other. The prongs are flat and rectangular in shape and their length is 1/5 of the total length of the sword. It also bears a green patina. The sword was moulded first and later on hammered. The sword under discussion is of type II, *i.e.*, right angle furcated antennae type classified by Yule (1982). On the basis of parallel typology, this sword can be identified with two swords from Rewari (Yule 1982) which are now exhibited in Narela Museum (Haryana) and one from unknown provenance now housed in Indian Museum, Calcutta and another sword from Chandausi (Yule 1982) now in the possession of Allahabad Museum. The blade portion of the sword resembles that of the swords from Shahabad and Modhera, both now in the National Museum collection (S.P. Gupta 1986). Though provenance of this sword is unknown, a close examination based on parallel typology connects it to Rewari (Rajasthan) and Modhera (Gujarat) and western Uttar Pradesh. The sword (Sr. No. 149, Acc. No. 88.46) of 1988 collection is fragmentary and fragile. Its blade portion is long and is curved backward. Its tip portion touches the right corner of the antennae. The blade is leaf shaped and thin with two side-edges partly worn out. The middle rib of the blade is prominent, flat and thick. Two antennae are of middle angle type and they are unequal as circular prongs made 20^0 to 30^0 angle in relation to the horizontal axis of blade. The butt end (hilt) is large, flat, thick and curved at side edge. It also has a hole near the adjoining portion of antennae and butt end, which was probably made for hafting this sword with a handle. It is covered with a green patina. This sword was made by the hammer-and-mould method and is rough and crude and comparatively inferior to that of the sword described earlier. The sword under discussion is identical with the three swords from Kanpur now in the collection of the National Museum, one from Bithur now in Cambridge Museum, one also from Moradabad and also with two swords from Shahabad (Gupta 1986) now in the National Museum Collection. On the basis of identical typology, the provenance of the sword can be assigned somewhere to the lower Doab region.

The third antennae sword (Sr. No. 151, Acc. No. 88.48) of 1988 collection is of middle angle antennae with a long blade. It can be identified with the above sword (88.46). Both the side edges of the blade are worn out and the blade is curved backward. Its two small but equal curved prongs make an angle of 30^0 from the horizontal axis of the blade. This was also made by mould and later on the edges of blade were trimmed by hammer. This sword resembles the one from Bithur and another of unknown provenance, one from Moradabad, and one from Rewari and also with other three: one from Modhera and two from the Shahabad all in the National Museum collection. On the basis of similarity in typology provenance of the sword can safely be located somewhere in the Doab region of Uttar Pradesh (Yule 1982, fig. 1039, 1050 and 1060).

The fourth fragmentary sword (Sr. No. 147, Acc. No. 88.44/1-2) in two pieces is also of middle angle antennae type. Its one antennae makes an angle of 30^0 from the horizontal axis and the second part is missing. Its butt end (hilt) is flat, broad and comparatively thicker. The blade is broad and leaf shaped. Its side edges tip is broken and also bears use marks. The medial ridge of the blade is prominently thick and flat. The manufacturing technique is the same as that of the third sword. The sword under discussion resembles the sword from Fatehgarh, one from Bithur, one from unknown provenance and also with the above mentioned second sword (88.46). This sword is almost identical with the two swords from Shahabad housed in the National Museum (Yule 1982, fig. 256, 1045, 1049 and Gupta 1986, Pl. 10 IV).

The fifth antennae sword (Sr. No. 156, Acc. No. 88.78) of this collection is of a high angle antennae type. Its two small unequal prongs of antennae bifurcates from each other at 120^0 angle the makes a 60^0 angle from the horizontal axis. The blade of this sword is leaf-shaped and thin in section. It also bears use marks and more than half of the portion at side-edges is worn-out and the tip is curved backwards. The medial ridge of the blade is thin and its butt end (hilt) is flat. In shaping this sword the mould-and-hammer technique has been applied. The shape of this sword is identical with the above mentioned two swords (88.79 and 88.86) and also the one from Bithur now exhibited in Cambridge Museum.

The sixth sword (Sr. No. 157, Acc. No. 88.79) is also of a high angle antennae type and its angle between two prongs is exactly identical with fifth sword (88.78) and the blade portion also has similarity in shape. The medial ridge of the blade is prominent and the butt-end is flat and rectangular. The manufacturing technology of this sword is the same as that of the fifth but the hammering technology is rough and crude. This sword has some resemblance with the two swords from unknown find spot and also with the one from Mehasana, now in the National Museum, New Delhi collection (Gupta 1986, Pl. 10V). The sixth sword is identical with one sword of the National Museum and one from an unknown provenance now exhibited in the Cambridge Museum and also with the one in British Museum, London (Yule 1982, fig. 1049 and 1050). The manufacturing technology of the fifth and sixth sword (88.79 and 88.88) is similar, *i.e.*, crude and rough and both are exactly identical with each other.

The seventh sword (Sr. No. 158, Acc. No. 88.80) is also a high angle antennae type and its angle between two prongs is exactly identical with the sixth and fifth swords. The blade portion is leaf shaped (broad) short type and its section is thin. The tip portion is curved backward and more than half part of two working edges is worn out. The sword under discussion is thinner and smaller than the fifth and sixth (88.79 and 88.78) but the shape of the swords of these three has some resemblance. The two antennae of these swords have resemblance with the few swords, *i.e.*, one of Mehasana (Gupta 1986, Pl. 10V) National Museum one from Chandausi now in Allahabad Museum, and one from Bithur (Yule 1980, fig. 1049) now in Cambridge Museum. The manufacturing method is the same as that of the sixth type. The blade portion of this sword hammers is peculiar, *i.e.*, leaf shaped, broad with thin section and has resemblance in shape with the three swords; fourth (88.44/1-2), fifth (88.78) and sixth (88.79). The blade was made thin and by the hammering method. The difference in typology, *i.e.*, thin blade, gives us the impression that these four swords certainly form a new variety in the antennae swords group of copper hoard collection, exact provenance of swords seven, six, five and four is (Sr. No. 150) unknown.

The eighth sword (Sr. No. 150, Acc. No. 88.47) is of a very low angle. The antennae type and its two short equal triangular prongs make a 5^0 angle in relation to the horizontal axis. The butt-end (hilt) is flat and broad. The blade is leaf shaped, narrow and thick with a double convex cross section. The rectangular shaped medial ridge is prominent and the two working edges of the blade have some use marks and the tip portion is bent backward. This was made by the mould and hammer method. This sword is more refined in finish. The sword under discussion is exactly identical in shape with the three swords from unknown find spots and also with the one from Kanpur and all these four are now in the National Museum (D.P. Sharma 1987, Pl. 3, 9 and 7).

The ninth sword (Sr. No. 148, Acc. No. 88.45) is of a low angle antennae type. Its two equal triangular antennae are curved towards vertical sides and taper towards its ends. The butt-end (hilt) is large, flat and rectangular at cross section. The leaf shaped blade is long and broad, more than half of its portion is curved backwards. The tip portion of the blade touches the prongs of the antennae. The two damaged edges of the blade are curved backwards. This sword was manufactured by the mould-and-hammer method. In the second stage blade, the butt-end and two prongs of antennae were trimmed by hammering. This sword is crude and inferior to the eighth one. The sword under discussion is identical in shape with the two swords from Fatehgarh. On the basis of parallel typology, the provenance of the sword under discussion might have belonged to the middle Doab region.

The tenth sword (Sr. No. 146, Acc. No. 88.48) is of a low angle antennae type, its two prongs of antennae, make and angle are of 15^0 in relation to the horizontal axis. The blade portion is narrow and has use marks on its two side working edges. The medial ridge is prominent. It was made only by the mould method. It has some resemblance with the three swords from Kanpur and also with the one from Shahabad (Yule 1982, fig. 1045) now in the National Museum (Gupta 1986, Pl. 10V).

The eleventh sword (Sr. No. 145, Acc. No. 88.42) is of a low angle type and one prong of the antennae missing and the intact one is circular in shape. The blade portion of this sword is long and thin. This was made only by the mould method.

The twelfth sword (Sr. No. 160, Acc. No. 88.82) is a fragment, its blade portion being intact. The blade is thick, broad and long and its medial ridge is prominent but the two side edges have strokes or use marks. The sword was first made by mould and later on trimmed by hammer. The present sword bears resemblance with the three specimens from the Doab region (Gupta 1986, List No. 35).

Harpoon (Illus. 5)

Till 1991, sixty one harpoons have been reported from the 12 localities of upper and middle Ganga-Yamuna Doab, western Uttar Pradesh and Haryana. This typical weapon has not been traced from any other part of south Asia except for north India. The harpoon can be associated with any contemporary material culture of upper Doab, *i.e.*, with the Aryans of Early Vedic period during the beginning of the second millennium BC. The pre-historic gallery of the National Museum had a total of 22 such weapons in its collection. Harpoons can be divided into two groups: (i) long spearhead type, (ii) short spearhead type. These implements can further be sub-divided into various sub-groups on the basis of its set of barbs.

The first harpoon (Sr. No. 142, Acc. No. 88.44) is of longer lance head or spearheads variety and the size of the spearhead (blade) is half its total length and its medial ridge is prominent. The set of pointed barbs emanate from the lower corners of the lance head. The other three sets of circular curved back barbs issue out from the long cylindrical stem. The portion has two conical lugs with a hole on each side. Technically and aesthetically, the harpoon under discussion is of a very high quality. It seems that it was made by double mould and later on its side edges and barbs were sharpened by the polishing and grinding method and at last some trimming was done by hammer. The present harpoon resembles the other three from unknown find spot, now in the National Museum (Gupta 1986, list 30, 31 and 87) and also with each one from Bisauli and Rajpur Parsu (Yule 1982, fig. 243 and 342).

The harpoon (Sr. No. 162, Acc. No. 88.84) is also of long lance head type. Its triangular lance head is half of its total length and the medial ridge is prominent. There is a concave depression on both sides of the lance head. The lower corner of the lance head has two straight barbs. It has thick long cylindrical stem (shaft) with the two side lugs. A set of three circular curved back barbs issue out from the stem. The upper set of the barbs are comparatively smaller than the lower two. This was also made by the double mould method. This does not have traces of trimming or finishing. Technologically and aesthetically, this harpoon is inferior to the first (88.40) as well as also with the one from Bisauli, another one from Rajpur Parsu (Gupta 1986) and three from unknown provenance now in the National Museum collection (Yule 1982, fig. 323 and 243).

The third harpoon (Sr. No. 88.43/1-4) is in four pieces. It has a very long lance head and is quite different in shape from the first and second. The lance head (blade) portion is partly damaged, narrow, thick and it covers 2/3 of the total length. There are two sets of circular curved barbs issuing out from the cylindrical shaft. The shaft has two conical lugs on each side. This harpoon is aesthetically superior to the previous two. This was made by the double mould method and was trimmed by hammer subsequently. The harpoon under discussion is identical with the other two harpoons from the unknown provenance.

The fourth harpoon (Sr. No. 144, Acc. No. 88.41/1-4) in four parts is also of a very long lance head type and more than one third of the lance head is missing. One set of barb is issuing out form the lower corner of the lance head. The shaft of this implement is cylindrical and its lower part is missing. There are two sets of curved barbs comparatively longer and issuing out from the shaft. The harpoon under discussion is more fragile, corroded and also has a thick coating of green patina. The fourth harpoon has some resemblance with the one from Shahabad (Yule 1982, fig. 1026) and also with other six from Shahabad now in the National Museum collection (Gupta 1986). These harpoons were probably used in hunting, fishing and also in war. All four harpoons were cast by the double mould along with barbs.

Weed Chisel or Spatula (Illus. 6, 7 and 9)

So far seventy one weed chisels with or without tang have been reported from 11 localities of Ganga-Yamuna Doab and Haryana. Archaeologists named the weed chisel as agriculture implement (D.P. Sharma 1987). There are 14 such implements in the National Museum collection. During 1986-87, author examined 4 weed chisels.

The first weed chisel (Sr. No. 136, Acc. No. 88.34) is 'V' shaped and thin. Both its flat sides and its two sides are smooth and its two side edges are straight tapering towards the butt-end with the side depression in the middle. It has a small thin rectangular tang attached near the butt-end. It also has a concave depression on each side near the joining part of tang and celt. It seems that the manufacturing technique was as follow us. It was first cut from a thin sheet of copper, and in the second stage both sides were made flat by hammer beating, and in the third stage the edges were trimmed and made sharp by abrasion. These were used for agricultural purpose and we have the ethnographic parallel of such implements in western Uttar Pradesh and Haryana. The chisel under discussion is identical with the other five weed chisels found from Shahabad (Yule 1982, fig. 222 and 227).

The remaining three weed chisels are of untanged type. The second weed chisel (Sr. No. 137, Acc. No. 88.35) is also of 'V' shape without a tang. Its cutting edge is convex and bears use marks. Both side-edges of this chisel taper towards its butt-end. This implement would have been used after hafting in the handle. The chisel under discussion is identical with the ones from Bahdarabad and Gungeria and Rewari (Yule 1982, fig. 745-46) and also with the one from Sitapur (Gupta 1986).

The third untanged weed chisel (88.36) is of rectangular 'U' shape with the convex working edge and both its edges are straight. It has some resemblance with a weed chisel from Kanpur (D.P. Sharma 1987) and another one from Hardoi (Gupta 1986) and one each from Rewari and Shahabad (Yule 1982, fig. 712).

The fourth weed chisel identical with the third (Sr. No. 138, Acc. No. 88.36) above is also of 'U' shape and untanged type. This is comparatively wider than above (88.35) and the third (88.36). This shows resemblance with the weed chisel from the following localities: four from Bahadarabad, three from Rewari, one from Mitathal, one from Bisuali, one from Shahabad, and three each from Saharanpur, Kanpur and Shahabad (Yule 1982, fig. 222, 225, 694, 218, 242 and 712).

Earlier weed chisel type implements were classified as bar celts by (Yule 1982) but the bar-celts are longer in length than weed chisel; whereas the weed chisels are less than 30 cm in length. A few other classified tang type such implements with long flat celts or spatula. S.P. Gupta, D.P. Sharma and the present author, on the basis of typology, classified this implement as weed chisel (Sharma 1987). This implement is thinner (2 to 4 cm) in comparison with the bar-celt and flat-celt of similar shape; so most appropriate name of this implement is weed chisel. All the above four weed chisels were made by the hammer method and the working edges were made by the method. These are agricultural implements.

Rings (Bangles)

The rings were discovered along the copper hoard from the localities of Rewari, Pauli, Kamalpur, Meethathal, Manipuri, Bhadrabad, Pondi, Aguibani, Kayatha, and Kiritpur and also as stray finds from a few other localities. Two rings of this collection were made by thick copper wire. First the copper wire was made by the solid cast method in the form of rings. It has one joint and the shape is identical with the rings discovered from Rewari. Copper rings were known in India since Ganeshwar (2800 BC).

Shoulder Celts (Illus. 8)

A total of 141 shoulder celts have been reported in India. The National Museum, New Delhi has a total of 37 such implements from the localities of Doab.

The first shoulder celt (Sr. No. 149, Acc. No. 88.72) has a large circular hemi-spherical working edge which covers half of its total length. Not only its butt-end but both sides of the celt are also straight. This has some resemblance with the four celts from Chotanagpur and also with the other two from Hardoi (Gupta 1986; Sharma 1987).

The second shoulder celt (Sr. No. 123, Acc. No. 88.21) has a hemi-spherical working edge but its two side-edges are concave. The celt under discussion is identical with the three shoulder celts from Gungeria and one from Agibani (Yule 1982, fig. 352) one from Unnao and three from Kanpur.

The third shoulder celt (Sr. No. 144, Acc. No. 88.67) is exactly identical with the first (88.72) but its working edge is 1/3 of its total length.

The fourth celt (Sr. No. 155, Acc. No. 88.71) is of 'U' shape and its working edge is sharp convex and truncated at two places. Typologically, this celt is identical with the celt from the Shahabad.

The fifth shoulder celt (Sr. No. 126, Acc. No. 88.24) has a hemi-spherical working edge which covers half of its total length, but its two side-edges taper towards its butt-end. Two corners of the butt-ends are angular and the side-edges are straight. The celt is identical with the two pieces from Etawa and one from Manipuri and three from Bithur and also with the two from Shahabad (Yule 1982, fig. 290, 771, 772 and 777).

The sixth shoulder celt (Sr. No. 131, Acc. No. 88.29/1-2) in two pieces is identical with the sixth celt (88.24) but its two shoulders are more concave than above. This celt has some resemblance with the celt of the National Museum collection (Gupta 1986).

The seventh (Sr. No. 126, Acc. No. 88.24) and ninth shoulder celts are fragments. The shoulder celt weapons have been reported in large numbers from eastern India and a few from lower Doab. The identical type of copper shoulder celts were found from Gomun, Don in Thailand and a few other localities in Vietnam. In Thailand the earliest shoulder celt can be dated to the end of third and beginning of second millennium BC (200 BC). This is probable that this type of implement in eastern part of India and also further up to the Doab region, came from the migration of Bronze Age people of south-east Asia, because we have the early date of such weapons from Thailand and Vietnam. The earliest Bronze in S.E.A. is 2700 BC from site Non Nok Tha Cap in Thailand (Sorensen 1988). Some linguistic similarity with the Monkhamer tribes of north-east India and Burma further confirms the migration of people from south-east Asia to India. The author is of the opinion that the shoulder celt weapon in copper hoard culture has south-east Asiatic origin. The circular working edge of shoulder celt were make by the abrasion method.

Chisel (Illus. 7 and 9)

Copper chisel (Sr. No. 134, Acc. No. 88.32) has a sharp convex working edge with the use marks. The butt-end is flat, thick and straight. Both side-edges are concave, straight and taper towards its butt-end.

Flat Celts (Illus. 10)

In all total around 400 flat celts have been reported from various localities of India. The National Museum, New Delhi, has 76 flat celts in its collection. 16 celts were examined by the author during 1990-91.

The first flat celt (Sr. No. 156, Acc. No. 88.75) of this year is of 'U' shape. It has convex working edges and its two side edges and edges of butt-end are straight. The second celt (Sr. No. 155, Acc. No. 88.77) is identical with the first but it has use marks on the working edge. The third (Sr. No. 149, Acc. No. 88.72) and the fourth (88.19) celts are also identical in shape with the first one. The first four celts have 'U' shaped flat sides.

The fifth celt (Sr. No. 153, Acc. No. 88.74/182) is of 'V' shape with a convex working edge. The sixth (38.18), seventh (88.30), eighth (88.30), ninth (88.38) and the tenth (88.23) are of 'V' shape type. The remaining six celts are fragmentary with straight side-edges.

Conclusion

On the basis of the find spots of copper implements this write concludes that the authors of the copper hoard were occupying more than 1,500,000 square km area. B.B. Lal is of the opinion that the authors of the copper hoard culture were purely local indigenous people. Sankalia (1974) and Geldern (1936) gave credit to the Vedic Indo-Aryans for the authorship of the copper hoard. M. Lal associates them with the Bronze Age culture of Thailand. S.P. Gupta and B.B. Lal opine that the Munda-Santhal tribes of hilly tract of Chotanagpur region of eastern India were the author of this culture. Gupta further suggests that Munda tribe first knew about copper hoard and due to their population increase they shifted toward west and encountered the Indo-Aryans in the middle Ganga-Yamuna Doab, who were coming from west, probably after defeating Indus people. Indo-Aryans probably were the author of the Ochre coloured pottery. The Ochre coloured pottery and copper hoard implements are found together in the middle and upper Doab region as has been proved from a few excavated sites of this region like Saipai and Bhadarabad, etc.

Gupta divided copper hoard culture into two groups, *i.e.*, A of eastern India (Bengal-Bihar) and B of Ganga-Yamuna Doab and western India. Tool type of group A are very simple and crude whereas copper hoard group B are more refined in manufacturing techniques, casting, forging, filling, etc. Gupta is of the opinion that migration took place from A towards B and antennae swords, spearheads and harpoons, etc. typical weapons of Doab region of group B were locally evolved in the middle and upper Doab region. The copper implements of group A were made by rudimentary casting shoulder celt, flat-celt and bracelets implements of group A have been copied from the flat stone celt of Neolithic period. The author is, however, of the opinion that on the basis of tool typology and manufacturing technique of copper implements of group A were made by rudimentary casting shoulder celt, flat celt and bracelets implements of group A have been copied from the flat stone celt of Neolithic period. The author is, however, of the opinion that on the basis of tool typology and manufacturing technique of copper implements the possibility of existence of two groups cannot be ruled out. The constant refinement in flat celt, etc. is also visible in Doab. No doubt a few shoulder celts were evolved in the eastern group A, due to the impact of shoulder celts from Thailand; because by this time migration of Bronze

Age people had started from south-east Asia. Other typical tools of group B, *i.e.*, harpoon, antennae swords, spearhead, etc. are very sophisticated warlike weapons. The manufacturing technique of these objects is very difficult in involving even double mould. It appears that weapons of group B indicates the arrival of a new race from West. It is not unlikely that authors of copper hoard weapon of group B might be associated with the late Harappan refugees or Indo-Aryans coming from the West. Furthermore, the group B of the copper hoard and the O.C.P. belong to the same people. According to J.P. Joshi, late Harappan pottery and O.C.P. belong to one culture and author is of the opinion that copper hoard culture of western group and late Harappan are of one group and eastern group of copper hoard came from SE Asia. According to R.C. Gaur (1983), the author of the O.C.P. originally belonged to the stock of pre-Harappan people and they were not only contemporary but survived by few centuries. Warfare was cap dominant feature of the life of group B as would be evident from their weapons like antennae sword, long hooked spearheads and harpoons. Garhwal, Kumaun, Udaipur and Khetri – (Neem ka Thana) regions were the main source for the copper are for the copper hoard culture people of group B and on this basis, beginning of group B copper hoard implements can be fixed in the first quarter of third millennium BC. The alleged anthropomorphic figure of lugged celt of Lothal is dated around 1900 BC. Some T.L. dates of O.C.P. sites of western India (Jodhpur) and Doab come around 2600 to 1400 BC. Thus, the period of copper hoard group B can be fixed from 2300 BC to 1400 BC. Copper implements of group A were used for cutting trees. The shoulder celts were used as tools for digging and ploughing. Bar celt and chisel implements were used in deep digging and breaking stones. The economic life of group A people was simple, rudimentary and they were probably involved in primitive agriculture and jungle clearance. The main sources of copper ore for the copper hoard people of group A was from Rakha mine in Chotanagpur, Bihar. The group A of copper hoard implements has a younger date. Its period can be fixed tentatively from 1900 BC to 1000 BC. The earliest date of copper metallurgy in eastern India is from Senuwar (Rohtas) dated around 1900 BC by ^{14}C dating method. The anthropomorphic figure is a common object present in both the groups of copper hoard culture. This is a cult object and was used for magico-religious purposes during the anthropomorphic period of Bhimbetka and Joka in Hazaribagh (Bihar). During the Indus valley period (2700 BC) the form of Taurine or *Nandipada* of terracotta's showing some resemblance to the anthropomorphic figure was reported from Mohen-jodaro. About the antiquity of the anthropomorphic figure, the author feels it has a very long history since the upper Palaeolithic period. Bone figure from Lohanda Nala in Belan valley reported by G.R. Sharma is not a harpoon as said by S.P. Gupta and R. Tewari but this is an archaic form of a proto-anthropomorphic figure. The copper hoard people used this object for magico-religious purposes. The anthropomorphic form of a Taurine symbol found during the early historic period art has its origin in the anthropomorphic figure of copper hoard culture. The anthropomorphic form of Taurine shaped beads in found symbols were also noticed in the sculpture as the necklace of Yaksha from Pitalkhora, now exhibited in the National Museum, New Delhi and also in the necklace of Yakshi of Bharhut, now exhibited in the Indian Museum, Calcutta. Huge grand stone of 9 high anthropomorphic shapes dated to the early Megalithic period (1000 BC) was reported from Mattur, in Tamil Nadu. All the above evidences confirm that the anthropomorphic figure of the copper hoard culture found in both groups and similar types of figure was prevailing since the pre-copper hoard period and continued till the early historic period and modern Birkhaur tribes of eastern India.

BIBLIOGRAPHY

Agarwal, D.P. 1969. Copper Hoard Problem: 'A Technological Angle'. *Asian Perspective* 12: 119-133.

Allchin, B. and F.R. Allchin 1982. *The Rise of Civilization in India and Pakistan*. Cambridge: Cambridge University Press.

Dikshit, K.N. 1986. The Copper Hoards in the Light of Recent Discoveries. *Bulletin of Ancient Indian History and Archaeology* 11: 43-50. Sagar.

Gaur, R.C. 1982. Kiratpur Copper Hoard. In *Madhu: Recent Researches in Indian Archaeology and Art History*. M.S. Nagaraja Rao (ed.): 19. New Delhi: Agam Kala Prakashan.

Gaur, R.C. 1983. *Excavations at Atranjikhera*. Delhi-Patna-Varanasi: Motilal Banarasidass.

Gupta, S.P. 1965. Further Copper Hoard: A Reassessment in the Light of New Evidence. *Journal of the Bihar Research Society* 57: 1-7.

Gupta, S.P. 1982. Alleged Upper Palaoeolithic Bone Mother Goddess from Belan. *Puratattva* 11: 116.

Gupta, S.P. 1986. Copper Hoard Implements in the National Museum Collection. *Puratattva* 16: 45-46.

Heine-Geldern 1936. Archaeological Traces of the Vedic Aryan. *Journal of the Indian Society of Oriental Art* 4: 87-113.

Kumar, K. 2000. "Anthropomorphic" was Vedic god Indra. In *G.R Sharma Memorial Volume*. V.D. Misra (Ed.). Allahabad.

Lal, B.B. 1951. Further Copper Hoards from the Gangetic Basin and a Review of the Problem. *Ancient India* 7: 20-39.

Lal, M. 1984. *Settlement History and Rise of Civilization in the Ganga Yamuna Doab from 1500 BC - 300 AD*. New Delhi: B.R. Publishing Corporation.

Pant, G.N. 1978. *Indian Arms and Armour*, Vol. I. New Delhi: Agam Kala Prakashan.

Rao, S.R. 1985. *Lothal: A Harappan Port-Town*. 1955-62.Memoirs of the Archaeological Survey of India, no. 78, New Delhi: Archaeological Survey of India.

Sankalia, H.D. 1974. Prehistory and Protohistory of India and Pakistan. Poona: Deccan College Postgraduate and Research Institute.

Sharma, D.P. 1987. Copper Hoard Implements in the National Museum, New Delhi, 1987 'Collection'. *Puratattva* 17: 72-73.

Sharma, Madhuri 1989. Taurine Symbol. In *The Ear Ornaments of Ancient India.* M. Postel (ed.): 191-202. Bombay: Franco-Indian Pharmaceuticals Ltd.

Sorensen Per (ed.) 1988. *Archaeological Excavation in Thailand.* London: Curzon Press.

Singh, B.P. 1989. Early Forming Communities of Kaimur Foothills. *Puratattva* 19: 6-18.

Tewari, R. 1986. Harpoon from Mirzapur. *Dhyanam* 5 and 6: 31. Lucknow.

Wakankar, V.S. and Robert R.R. Brooks 1976. *Stone Age Paintings in India.* Bombay: D.B. Taraporewala and Sons.

Yule, P. 1982. *Metal Work of the Bronze Age in India.* Munich.

D.N. DIMRI

Recent Archaeological Discoveries at Ahichchhatra: An Appraisal

Lying at a distance of 11 km north of Aonla, the Tehsil headquarters of district Bareilly U.P., is Ahichchhatra (20^0 22″ N; 79′08 12″ E), nestled between rivers Aril and Paria, which are the tributaries of Ramganga. Geologically, the area forms a part of Indo-Gangetic alluvium which consists of sand, clay, *kankar* and *reh*. It is almost an open plain with slight undulation which is more pronounced in the southern part, the surface is being diversified by numerous river valleys.

The main river of this region is the Ramganga which enters from the west and flows south-east, separating tehsil Aonla from the rest of the region. The other rivers flowing in the area are the Siddha, the Dojora, the Bahgul (west), the Sankha, the Deoranian and the Nakatia and their tributaries, which generally run in south and south-east directions to join the Ramganga. The river Bahgul run through the district up to Fatehganj east while the Deoha is only touching its eastern boundary for about 14 miles and leave the district near Maholia Jalalpur. Aril, the one of the important rivers of the area presently flows at a distance of about four miles away might have been running closer to the Ahichchhatra in the past. The climate of this region is influenced by the district's proximity to the hills and the tarai swamps to the north. The annual rainfall varying from 982.1 mm (38.66″) at Aonla (in the south-west corner of the district) to 1259.7 mm (49.60″) at Baheri (in the north) which generally increases from the south-west towards the north-east. The chief varieties of trees found in the forest in waste land of the region are groups presenting a well-wooded appearance. In some place there are avenues of ornamental trees along the roads the chief being that of Eucalyptus, *Ashok*, *Gulmohal* and *Kanakchampa*.

Ahichchhatra Through the Ages

Presently, confined to the great fortress, just outside of the village of the Ramnagar the remains of the Ahichchhatra are spread in the large area outside of the existing fort. It once formed a part of the ancient country of Panchala which was later, divided into north and south Panchala (with the Ganga as the line of demarcation). The present Bareilly district was included in the north Panchala with its capital at Ahichchhatra or Chhatravati, while the region south of Ganga was known as South Panchala with Kampilya as its capital. It is believed that the earliest known Aryan people, who settled in this region, were close allies of the Kurus as indicated by joint name Kuru-Panchala and the Pururavas was the first monarch who held sway over this region. His great grandson Yayati is said to have ruled over the whole of Madhyadesh including Panchala region. Puranic tradition speaks that the Panchala as were so named after the five sons of Bhrimyashva (sixth in descent from Ajamindha) who were nicknamed the five capable ones (Pancha-alam). During the *Mahabharata*, the Panchala was ruled by Drupada. However, till the Mahabharata period, there are no references of north and south Panchala as separate states and most of famous Panchala kings ruled from Kampilya. Jataka story tells that a Chedi prince of Kampilya went to the north and forms the north Panchala kingdom while the Ahir Raja was ruling over the region of Ahichchhatra as petty prince. During the eighth-ninth century BC, Naga dynasty was ruling at Ahichchhatra. According to Jain tradition, the twenty third Tirthankara Parsvanath also visited the city of Ahichchhatra during this period. The Buddhist traditions also speaks that the Buddha preached the dhama for seven days to the Naga king near Nagahrida (serpent tank) out side the city.

Panchala figures as the tenth in the list of the sixteen *Mahajanapada*. In the middle of the fourth century BC, this territory was annexed to the Nanda Empire of Magadha, probably in the reign of Mahapadmananda. It is believed that the great *stupa* identified with the mound known as Pisanhari-ka-Chhatar outside Ahichchhatra fort was built by Asoka. The numerous coins discovered from the site and the adjoining regions, generally assigned to *circa* 200 BC to 350 AD suggest that at least twenty-seven kings known as Panchala ruled from Ahichchhatra. Pabhosa Cave Inscription of Allahabad suggests that Rudragupta, Jaigupta, Damagupta were amongst the earliest kings of Panchala region and were succeeded by Mitra dynasty around 1st century BC, but when the Kushan power under Kanishka expanded eastward in the beginning of the 2nd century, the Mitra rulers were subjugated by him and most likely allowed to live as feudatories.

The Gupta king, Samudragupta, led his first campaign into Aryavarta by uprooting the neighbouring kingdom of Achyuta and ruled over this region till about 550 AD. Numismatic evidences suggest that, this region was ruled by Maukhris in the later half of the sixth century, in whose time the kingdom of Kannauj extended as far as Ahichchhatra. The Banskhera plate inscription of Harsha (606-647 AD) revealed that this area formed part of the Ahichchhatra Bhukti of this empire. The Chinese pilgrim Hiuen Tsang visited Ahichchhatra about 635 AD and came across about ten Buddhist monasteries and nine Deva temples. After the death of Harsha, the history of this region for more than half a century, as that of the rest of the India spells anarchy, till it was included in the dominions of King Yasovarman of Kannauj. During the period of Gurjara Pratiharas, Ahichchhatra remained flourishing town till the beginning of 11th century AD.

Discovery of Ahichchhatra and Early Researches

In 1832, Captian Hodgson visited the ruins of Ahichchhatra for the first time and described the place as "the ruins of an ancient fortress, several miles in circumference, which appears to have had 34 bastions, and is known in the neighbourhood by the name of the 'Pandus Fort'.

An extensive survey of Ahichchhatra was made by Cunningham who also carried out excavations at few places. He confirmed that the town is defended by natural obstacles comprising of twelve monasteries and nine Brahmanical temples, the *stupa* near the serpent tank outside the town along with four small *stupas* and a 3.5 miles long wall in an irregular right angled triangle shape (Illus. 1). A. Fuhrer partially excavated a temple in the city and reported that the copper coins of Mitra rulers are frequently exhumed by ploughman from the interior of the fort and the neighborhood. In addition, Fuhrer also described about Lingam temple named Bhim-ka-Gaja (Illus. 2) and Buddhist *stupa* built by Asoka locally known as Pisanhai-ka-Chhattar, (Illus. 3) a large tank to the north-west of the *stupa* called Ghandan Sagar and Adi Sagar built by Adiraja. In 1888, the survey party of the province excavated two Buddhist mounds and brought into light a few sculptures and Mitra coins. Later, Surendranath Majumdar also carried out a study on Ahichchhatra and reported 32 towers including those built by Ali Muhammad Khan, about 200 years ago, to restore the fort with a view of making it his stronghold, in case he should be pushed by the King of Delhi.

K.N. Dikshit and A. Ghosh of the Archaeological Survey India excavated at Ahichchhatra, during 1940-1944 and revealed nine distinct strata of occupations assignable to the period spanning from 300 BC to 1100 AD. The excavation also revealed cast coins of the Panchala rulers and coins of Acyu, unanimously identified with Acyuta. The important finds from stratum I (850-1100 AD) are hoards of 203 debased Indo-Sassanian coins of Adivaraha and Vigraha. This excavation brought to light two terraced brick temples of Gupta period (Illus. 4-5) and a pair of highly artistic life sized Ganga and Yamuna figures were found at the entrance of the larger temple (designated as temple no. 1). Presently, both the figures are at display in the National

Museum, New Delhi. In addition, fortification wall was also partially excavated at two places and it was found that the original rampart was erected around 100 BC.

Ahichchhatra was further excavated by N.R. Banerjee of the ASI in 1963-64 and 1964-65 to obtain a fresh index of the site. The excavations revealed that the earliest deposit, *i.e.*, Period I, is without any structural remains and clear-cut deposit of the OCW over the natural soil. Period II was characterized by the PGW and a red ware dish-on-stand including mud bricks and a broken baked brick. Both copper and iron were also found during this period. Period III which overlaps with the preceding and succeeding had the NBPW with the usual associated red ware. Baked bricks were also in use. Period IV had the Kushan bowl, sprinkler, inkpot shaped lid and jar with stamped decoration. Besides, coins of Panchala, Kushan and Acyu, houses made of burnt bricks of various sizes have also been revealed from this level.

The excavations also threw more light on the fortification wall (Illus. 6-7) which seem to have been initially made of mud in the beginning of Kushan period, as evidenced by shreds of the PGW and NBPW found from its core. The second phase of the wall was erected with a brick wall of 4.98 m width and 2.59 m in height with rectangular gaps in its core. In the third phase, the brick wall was protected by a mud cover which again was buttressed in the fourth phase. Lastly, gaps in the outer wall or mud packing were filled with fragmentary walls of brick and brickbats.

Present Work and Results

The Archaeological Survey of India and Indian Institute of Technology, Kanpur signed a Memorandum of Understanding for collaborating in capacity-building in the area of application of modern technology for research in archaeology and cultural resource management. The combined team of ASI and IIT has carried-out Ground Penetrating Radar (GPR) survey at Ahichchhatra in the month of September, 2007 outside of the fortification wall, where series of the small mounds exists. The present work was mainly aimed to cross-check the result obtained through preliminary investigations on Ground Penetrating Radar System survey through trial excavation. The preliminary study of GPR survey in one of the mounds in this area indicates that there are structures all around the mound with a depression in the centre but excavation carried out so far could not substantiate the facts and need further investigations. At other places, this survey shows apparent features of street and steps at about one meter below the existing ground level, which is yet to be confirmed. However, available results so far indicate that the study through GPR survey may be helpful for single culture settlement and it is to be re-examined that how far such study will benefit for understanding multicultural settlement and how they are planned, as in the case of Ahichchhatra.

In addition, the present excavation was undertaken to reveal cultural sequence of early deposit and also to impart field training to the students of Post-Graduate Diploma of Institute of

Archaeology, New Delhi, it was decided that the excavation may be conducted in first phase outside of the fortification wall to save a series of ancient mounds which are slowly being obliterated and brought under cultivation, while in the second phase, the digging may start inside the fortification wall to reveal cultural sequence of early deposit.

Before describing the result of present work, the author proposes a new term 'Mitra Panchala in place of 'Sunga-Kushan', in reference to the Panchala region. This is because the post-Mauryan cultural period contemporary to Sunga-Kushan in other areas are not represented at Ahichchhatra in their full expression of pottery and other significant objects. Here all the coins found during excavation represent the Mitra kings of Panchala lineage, highlighting the local and individual personality of the city. It appears that the city maintained its identity independent of the suzerainty of Kushan rule. It was only the sword of Samudragupta that subdued Achyata, the last of the Mitra kings of Panchala. Therefore, paying respect to the independent personality of the site, the period contemporaneous to Sunga-Kushan, is termed as Mitra Panchala (200 BC - 200 AD).

The excavation was started in January 2008 at the eastern most extension of the mound outside the fortification wall in four localities (Illus. 5). The cultural deposit varied in all four mounds, however, maximum five meters cultural deposit was found in this area assignable to Mitra Panchala period (200 BC - 200 AD), Gupta and post-Gupta period. Due to limited area of excavation, it was not possible to ascertain regular habitational deposit of the early phase of Mitra Panchala period, but large numbers of structural activities were noticed in the subsequent period. The most significant find from one of the mounds is the evidence of a large number of conical crucibles, vitrified in various degrees. Sometimes, copper ingots attached with crucibles (Illus. 8-9) are also found. Besides, evidence of broken furnace and slag material has been found as well. In another trench, large numbers of earthen pots complete in shape along with few terracotta dabbers, both broken and intact, were encountered. Presence of pre-firing, de-formed and de-shaped pots is also significant. The above mentioned artifacts suggest that this particular area was used as workshop for both copper working and pottery manufacturing during the Mitra-Panchala period. A few large pits, cut into the natural soil in various phases have also been noticed. Generally, these pits contained ashy deposit, however, some antiquities including semiprecious stone beads, bone points, terracotta figurines; stone objects etc. are also found from these pits which further suggest that this area was used as workshop and these pits were used for dumping waste. In another mound, cultural deposit of 4.15 m was noticed. It has been noticed that the large number of ancient bricks have already been taken away from this area as evident from several ghost walls from the upper level of mounds. However, brick structures exposed in different phases probably belongs to later-Gupta or post-Gupta periods including a massive brick structure with offset and steps on the north side (Illus. 10). Large number of moulded bricks and brick tile fragments are found from the debris lying near the steps. The size of the moulded bricks is 36 x 20 x 5 cm, while brick tiles measures 23.5 x 20 x 2 cm (Illus. 7). Besides, a channel like structure made of 40.5 x 24 x 4.5 cm sized brick measuring 3 m length and 1.09 m width with a gap of 25 cm in between is also exposed partially (Illus. 11).

The highest mounds in this area having cultural deposit of about 5 m revealed structural remains of two periods, one certainly later Gupta, and other to post-Gupta. However, the huge quantity of carved bricks of Gupta period found from the collapsed debris suggest that some additions and alterations were made to classical Gupta structure during the later Gupta and post-Gupta times. Excavations revealed several structural activities of both the periods. Mention may be made of two brick structures, one measuring 13 m x 9 m and the other 7 m x 5 m, constructed during the later Gupta. However, some addition and alterations to these structures were made during the post-Gupta period. These structures were made of various sizes of bricks joint with mud mortar. Another important finding from the mound is the discovery of a well (Illus. 12), cut into the natural soil through the Mitra-Panchala deposit. The well with inner diameter of 1 m and outer is of 1.6 m and made of wedge-shaped bricks (25 cm x 20 and 15 cm x 6-7 cm) with mud mortar. 62 bricks courses of the well are exposed so far. Here also due to limited space of excavation, no proper plan of Mitra-Panchala structures could be revealed. Several pits dug into natural soil, filled with ash, sealed by earlier deposit were encountered. Most of the structures at the mound have been heavily robbed and at many places, they are represented only by the ghost. A variety of ceramics have been recovered from the excavations. Other noteworthy antiquities include a human head (Illus. 13), beads of semi-precious stones like carnelian, agate, quartz and beads of fiance and paste (Illus. 14).

A small mound rising to a height of three meters from the surrounding fields was also excavated. The excavation revealed a rectangular platform of square bricks (brick size: 35 cm x 35 cm) surrounded by brick paving. Three chambers measuring 5 x 6 m are exposed. Major part of the platform had been robbed but wherever it survived was overlaid with collapsed brick structure probably of a temple (Illus. 15-16). The moulded and carved bricks used for construction suggests that the structure was built during late Gupta period (Illus. 10). During the course of excavation, several sandstone chips of human body like faces/heads have been found. A negligible amount of potsherds have been noticed from this area. Due to the limited area of the excavation, the detail of the extension of the structure could not be traced.

The antiquities found from this area include terracotta fragments of animal figurine, sling balls, bangle, hopscotch, toy cartwheel, fragments of stone pestle, bead of semi-precious stones, *i.e.*, carnelian, agate, and beads of paste and glass. In addition to this, fragment of terracotta, plaque of Mahishamardini Durga and terracotta plaque of female figurine are recovered. Copper coin of Panchala king Achyut along with some other few coins, which are yet to be identified are other noteworthy findings. A few sherds of red polished ware are also found to the north of the massive brick structure (Illus. 17).

The excavated evidences so far revealed that the eastern part of outside the fortified city of Ahichchhatra where excavation have presently been concentrated was not used for residential purposes during Mitra-Panchala period and was rather used only for industrial purpose particularly for copper working and pottery-making activities as evident from large number of crucibles, huge pits for dumping of waste and pottery kilns from this area. Even in the later periods, no regular occupational deposits were encountered. The exposed structures generally appear to be religious in nature suggesting that Ahichchhatra acquired the status of a religious city during post-Gupta and even in the later period since such religious activities were also taking place outside of fortified city.

Archaeological Survey of India further resumed excavation in the eastern sector of the fortified city of Ahichchhatra in the field season 2008-09 in order to obtain cultural sequence of early period afresh, to collect samples for scientific dating and to understand plant economy of ancient Ahichchhatra. Initially, two trenches B 78 x 18 and B 78 x 28 were laid out on the highest point of the eastern most mound. Later on, another trench B 50 x 75 was laid out on the slopes of a mound of considerable height, lying along the Kachchha road from Anandpur cutting across the city and leading to Nasratgunj with a view to get to the PGW and earlier cultural assemblages.

The eastern trenches so far been excavated have revealed 3.4 m cultural assemblage that is divided into two periods. The upper 2.5 m deposit is assignable to Mitra Panchala period, while the lower 90 cm deposit belongs to Mauryan period which still continued. The topography of the area indicates that there is more then one meter occupational deposit still lying buried above natural soil. The upper most layer of the mound has yielded coins of Achyu(ta), the king mentioned in the Prayag Prashasti of Samudragupta. In the immediately lower layer, coins of Phalgunimitra, Bhunumitra, Agnimitra, etc. respectively were found. The pottery is more like the Kushan but not the typical Kushan ware (RPW) and shape (sprinklers) are conspicuous by their absence. Among important finds of the period are tubular amulets, antimony rods, inscribed object of copper, beads of semi-precious stones including carnelian, quartz, amethyst, garnet, chert, etc., spools/ear studs of lead and a few punch-marked coins of silver and copper silver mix. So far only four structural phases have been encountered from Mitra-Panchala level. These structures are in the shape of rooms and walls made of burnt bricks of various sizes, *i.e.*, 37 x 47 x 8, 37 x 47 x 6.5 (Illus. 4-5). Successive mud floors have also been encountered from the early phase of the Mitra Panchala period but due to the limited area of excavation the exact nature of the structure could not be ascertained. The top level of Mitra Panchala period has revealed collapsed brick wall.

In the other trench on the slope from same area, below eroded material PGW sherds in association with red ware plain as well as mica dusted and basket or chord impressed were revealed. Lot of bones of larger animals were found which are yet to be studied and are likely to add some new facets to the cultural study. The total deposit so far excavated yielding PGW deposit is about 1.20 m. The area of the excavations is so small that this information needs to be re-confirmed at one or two more spots, which are already under way. However, some floor levels of the PGW culture have been encountered. From this area considerable quantity of charred grains of large variety from the PGW deposit was collected for study by Birbal Sahni Institute of Palaeobotany, Lucknow.

Scope for Further Researches

The Ahichchhatra remained culturally prosperous for a considerable period of time, particularly from 2nd century BC to 7th century AD. It was in its climax for art and architecture during Gupta period, as evident from exposed temple remains at the site. Several unique terracotta figurines are found including the life size images of Ganga and Yamuna, which are of its own kind presently displayed in the National Museum, New Delhi. The site required horizontal excavation, which will definitely help in understanding of detail town planning and settlement pattern of these stages in which Ahichchhatra is still lacking far behind.

Detailed study of the fortification wall is yet to be carried out. Though some works have already been carried out by earlier excavators but much is to be done. Since, Ahichchhatra remained under human occupation for several centuries, obviously, the fortification wall might have also been raised, repaired and modified in successive phases too, as per requirement of inhabitants. The detail stratigraphy, phases of construction, its nature and material used for construction at various levels and its relation with then the exiting town planning needs to be examined in details.

Due to limited area of operation, desired information in respect of earlier periods could not be collected in the past and needs to be re-examined through horizontal digging in these levels. The Archaeological Survey of India is making efforts to achieve above targets and hope the excavation in near future will solve these problems upto some extent.

Another aspect which has recently drawn attention to the Archaeologists is the dates of Northern Black Polished (NBP) culture which has now come around 1000 BC to 1500 BC from the excavation of Juafardih near Nalanda in Bihar (Saran *et al.* 2008: 59-73). So far, the dates of NBP culture have been placed between 300 to 700 BC and at a few sites, extended maximum up to 800 BC, however, the dates from Juafardih are certainly interesting and need to be re-examined from other NBP horizons. Not only this, the stratigraphy of the culture materials preceding the NBP also needs to be re-studied in present scenario. Since, Ahichchhatra has considerable deposit of NBP and the preceding period, hence, the excavation at this level will definitely help to solve these issues.

BIBLIOGRAPHY

Agarwal, V.S. 1947-48. Terracotta Figurines of Ahichchhatra. *Ancient India* 4: 104-179, pls. XXX-LXX.

Arya, Sushma 2001. *Panchal Rajya ka Itihas* (Hindi). New Delhi: Prachin Bhartiya Itihas Shodh Parisad.

Asthana, Sashi, 1979-80. A Unique Patravahaka Yaksha Image from Ahichchhatra, National Museum. *Puratattva* 11: 74-77.

Bajpai, K.D. 1956. *Ahichchhatra* (in Hindi). Lucknow.

Beal Samuel, Chinese 1958. Accounts of India, translated from the Chinese of Hiuen Tsang (2-Vol.): 228. Calcutta: Susil Gupta Ltd.

Cunningham, A. ASI Report for year 1862-63, Vol. I, pp. 255-56, map.

Deva, Krishna 1995. *Temples of India*, Vol. 1. New Delhi: Aryan Books International.

Dixit, M.G. 1952. Beads from Ahichchhatra. *Ancient India* 8: 33-63, pls X-XIV, fig. 1-6.

Fuhrer, A. 1891. *The Monumental Antiquities and Inscriptions in the North-West Provinces and Oudh.* Archaeological Survey of India Report, pp. 26-27.

Ghosh, A. 1989. *An Encyclopaedia of Indian Archaeology*, Vol. II pp. 7-9. Delhi: Munshiram Manoharlal Publishers Pvt. Ltd.

Ghosh, A. and K.C. Panigrahi 1946. Pottery of Ahichchhatra, District Bareilly, U.P., *Ancient India* 1: 37-59.

Indian Archaeology- A Review 1957-58: 71; 1959-60: 76; 1963-64: 43-44, pls. XXVII-XXX.

Hoshi, E.B. 1965. *Uttar Pradesh District Gazetteers*, pp. 21-69, 363-66, pls. I-IX. Lucknow: Govt. of Uttar Pradesh.

Kala, S.C. 1981. *Terracottas in Allahabad Museum*. New Delhi: Abhinav Publications.

Lal, B.B. 1952. Examination of Some Ancient Indian Glass Specimen. *Ancient India* 8: 25-26.

Saran, S.C., N.G. Nikoshey, S. Nayan, J.K. Tiwari, A. Arif and N. Saxena. 2008. Excavation at Juafardih and its Identification with Kulika. *Puratattva* 38: 59-73.

ANUP MISHRA

Archaeological Investigations in Deoha River Valley with Special Reference to Excavations at Abhaipur, District Pilibhit, Uttar Pradesh

1. Introduction

The systematic archaeological investigation in Deoha river valley, a major river of Pilibhit district, begins with the excavations at the site of Abhaipur in 2001. Subsequently, the entire river course in the Pilibhit district has been explored and different sites have been marked in the map in relation to their cultural affiliation. The region per se does not show any cultural distinction from the upper Ganga valley. The peopling of Deoha river basin begins with the onset of Ochre-coloured ware culture and Copper Hoard culture, followed by the black-and-red ware, painted grey ware and northern black polished ware cultures and so on so forth. While the copper hoard objects have been reported from the Bisalpur region of Pilibhit, the excavation at Abhaipur has brought to light the evidence of early Iron Age cultures. Before we discuss the above cultures, a brief note on the physiographic setting of Deoha river basin that played a pivotal role in shaping the human life will not be out of place here.

2. The River Deoha and its Physiographic Setting

The river Deoha has its source in the hills of Kumaun. It flows in north-south direction with its numerous affluent and debouches into Ramganga in Hardoi. The river enters the *terai* region of Pilibhit (180 msl) from the north and passes through the Bisalpur tehsil before entering into the border of district of Shahjahanpur (159 msl).

The landscape is a gentle undulating plain and is an open expanse of highly fertile loam or clay soil. It is well wooded and the character of landform changes gradually from that of *terai* in the northern portions of the Pilibhit tehsil to that of the open Gangetic plain in Bisalpur tehsil. The north is mainly rice-land interspersed with stretches of grass jungle valuable for grazing than cultivation. Down south, the stiff rice bearing clay gives way to the lighter wheat producing land in the Bisalpur tehsil, which is essentially characterized by *bhangar*. Though there are no hills, the surface level is varied by many troughs and depressions marking the beds of the rivers and water courses which carry off the surface drainage. These low basins are known by the generic name of *khadir*. The sub-Himalayan forest tract covering a small part in the north is conventionally known as *mar* and the plain is called *des*.

Pilibhit was once a happy hunting ground with its forests and swamps. Apart from occasional appearance of leopards in the high grassland in the fringes of Deoha river, wild pigs, spotted deer, hog deer, antelopes, blackbucks, swamp deer, sambhar and nilgai are commonly found. Besides, there are hares, foxes, jackals, wolves, wild dogs and porcupines found in the region. Apart from these, the land is also occupied by peafowl, jungle fowls, partridges, floricans and sand grouses. The swamps and water bodies are home of birds like geese, ducks, teals, widgeons, pachards, sheldrakes, cranes and ibis. Deoha river is one of the major fisheries. Among fishes, rohu, saul and carps are commonly found. The fertile landscape coupled with rich flora and fauna has been a favourable habitat for the man from the age of copper to the present day.

3. Early History and History of Researches

The ancient history of Pilibhit is still obscure. However, it can be seen in connection with the rise and fall of Panchala kingdom, whose capital was at Ahichhatra, near Bareilly. There are a number of literary and numismatic sources known today that throw substantial light on the ruling dynasties, kings, the people and their religions, and the society in this period (Cunningham 1871; Law 1984, 1999; Shrimali 1983; Vajpayee 1956; Pal 2000). However, the actual history of the region gets illuminated by an inscription of 10th century AD found from a temple at Dewal near Deoria (Bisalpur tehsil). It is the only written record of considerable historical importance that documents a great deal of the Rajputs of the region and their patriarchal and political connections (Princep 1837: 777; Cunningham 1871 (2000): 352-357, Buhler 1892: 75). It is written in *kutila lipi* or crooked script in the form of verses that narrates about erection of two temples dedicated to Lord Shiva and Parvati by Lalla, a *mandalapati* (chieftain), in the year 1049 of Vikram Era, corresponding to 992 AD. Here after, the history of the region revolves around the penetration of Musalmans, rise of Katheriyas and intervention of the Sultans of Delhi before the region gets into the hands of British.

Nonetheless, the ruins of fortress and settlements reported by a number of early explorers like Boulderson, Furore and Cunningham in the 19th century bear the testimony of a colossal ancient past. The District Gazetteer of Pilibhit (1911) documents a number of places of historical importance. Sir Alexandar Cunningham has recorded a few places in the Pilibhit and Bisalpur tehsils (Cunningham 1871: 351-358); however, none of them are in connection with the present study. Sibi Misra has reported a site of 7th century AD in the Pilibhit district. It is located 10 km north-west of Balpur and Sitarganj (*IAR* 1975-76: 57).

4. Recent Explorations

The entire course of Deoha river valley in the Pilibhit district, covering an area of about 450 sq km, was explored and 26 sites were identified. All these sites, their location, cultural affiliation and size in hectare have been tabularized below (also see Singh 2002-03). A brief discussion on the types and sizes of sites and their settlement pattern in different periods has been made in the conclusion. Apart from this, a few copper hoard objects have been collected from Bisalpur suggesting presence of a flourishing Copper Hoard culture in the region.

Table 1

Site Size and Cultural Affiliation, Deoha River Valley

Sl. No.	*Sites/Location*	*Pilibhit/ Bisalpur*	*OCW*	*B&RW*	*PGW*	*NBPW*	*Sunga-Kushan*	*Gupta*	*Post-Gupta*	*Area in hectare*
1.	Newar Aethpur ($79^0$48′ 45″ N: $28^0$44′ 20″ E)	P	-	-	√	-	-	-	√	8.4
2.	Badwar Tukpur ($79^0$48′ 18″ N: $28^0$43′ 33″ E)	P	-	-	√	-	√	√	√	10.5
3.	Bhanga Mahammadganj ($79^0$47′ 53″ N: $28^0$42′ 31″ E)	P	-	-	√	-	√	√	√	1.08
4.	Andarayan ($79^0$45′ 51″ N: $28^0$41′ 50″ E)	P	√	-	√	-	-	-	√	5.7

contd.

Sl. No.	*Sites/Location*	*Pilibhit/ Bisalpur*	*OCW*	*B&RW*	*PGW*	*NBPW*	*Sunga-Kushan*	*Gupta*	*Post-Gupta*	*Area in hectare*
5.	Kheragram (79°47′ 47" N: 28°40′ 26" E)	P	-	-	-	-	√	√	√	2.88
6.	Pilibhit (79°48′ 20" N: 28°37′ 58" E)	P	-	-	-	-	-	√	√	0.7
7.	Kanakor (79°45′ 22" N: 28°32′ 23" E)	B	-	-	-	-	√	√	√	16.8
8.	Ujhaniya (79°46′ 41" N: 28°31′ 36" E)	B	-	-	-	-	-	-	√	2.4
9.	Bhainsa Gwalpur (79°46′ 40" N: 28°29′ 47" E)	B	-	-	-	-	√	-	√	1.35
10.	Kokala (79°46′ 51" N: 28°25′ 26" E)	B	-	-	-	-	√	√	√	1.15
11.	Kokali (79°47′ 9" N: 28°25′ 12" E)	B	-	-	-	-	-	-	√	3.6
12.	Umarsar (79°47′ 42" N: 28°30′ 57" E)	B	-	-	√	-	√	-	√	4.18
13.	Lalaur Gujranpur (79°49′ 16" N: 28°23′ 37" E)	B	-	-	-	-	√	√	√	2.4
14.	Katakwara (79°47′ 2" N: 28°23′ 43" E)	B	-	-	√	-	√	√	√	4.5
15.	Bahadurpur Keesni (79°45′ 17" N: 28°20′ 49" E)	B	-	-	√	-	√	√	√	1.2
16.	Mahua (79°46′ 52" N: 28°21′ 1" E)	B	-	-	-	-	-	-	√	1.37
17.	Chausar (79°45′ 26" N: 28°19′ E)	B	-	-	-	-	√	√	√	0.55
18.	Arjunpur (I) (79°46′ 44" N: 28°19′ 51" E)	B	-	-	-	-	-	-	"	3.43
19.	Arjunpur (II) (79°46′ 44" N: 28°19′ 51" E)	B	-	-	-	-	-	√	√	1.1

contd.

Sl. No.	*Sites/Location*	*Pilibhit/ Bisalpur*	*OCW*	*B&RW*	*PGW*	*NBPW*	*Sunga-Kushan*	*Gupta*	*Post-Gupta*	*Area in hectare*
20.	Abhaipur I (79^{0}45′ 26″ N: 28^{0}18′ 51″ E)	B	√	√	√	√	-	-	-	8.75
21.	Abhaipur II (79^{0}45′ 26″ N: 28^{0}18′ 51″ E)	B	-	-	-	-	√	√	√	2.25
22.	Mahadeva	B	-	-	-	-	-	-	√	1.2
23.	Mudiyakaror (79^{0}46′ 40″ N: 28^{0}16′ 1″ E)	B	-	-	-	-	√	√	√	2
24.	Nawada Mahesh (I), (79^{0}49′ 5″ N: 28^{0}25′ 49″ E)	B	-	-	-	-	-	√	√	4.56
25.	Nawada Mahesh (II) (79^{0}49′ 5″ N: 28^{0}25′ 49″ E)	B	-	-	-	-	√	√	√	9
26.	Baramau (79^{0}51′ 6″ N: 28^{0}25′ 55″ E)	B	√	-	√	-	-	-	√	1.12
	Total		03	01	09	01	14	16	25	

4.1. Copper Hoard Culture

So far, Deoha river valley was *terra incognita* in terms of occurrence of copper hoard objects. In fact, these objects were going to be melted by the local people after being collected by the rag-collectors since time immemorial. However, due to the effort of the members of a registered organization, "Ganges Culture and Heritage Awareness Society (GCHAS)" based in Bareilly in the direction of making the people aware of these antiquities, these objects are now sold to the antique collectors rather than the rag-collectors (*kawadiwalas*). Although it has a darker side, yet the antiquities are saved from being melted. A total of seven objects have been collected from Bisalpur region, which constitute two hooked swords and five harpoons (Illus. 1).

The swords are 52 cm and 66.5 cm in length and weigh about 1240 gm and 1260 gm respectively. Both have prominent angular midribs on either side and have very sharp crumbled edges. The handles are flat, rectangular and measure about 10.5 cm to 11 cm in length. Both the swords have one hook each, which are made by cutting out the handle itself.

Two types of harpoons are found. The first type is with long arrowhead type blade and three pairs of distinct barbs and a pair of short, blunt projections jutting out at the end. The arrowheads have also two barbs each. There are two harpoons found in this type. Both the harpoons have very prominent midribs; however, in one case the rib runs from the tip down to the last pair of blunt barbs or projections while in the other case it is present only on the arrowhead. The barbs are oblique in the former case and are jutting out from the ribbed shaft. In the latter, these are curved backwardly with splayed out pointed tips and are emerging out of a cylindrical shaft. The barbs are paired up oppositely in both cases. The shaft ends, in both types, are cylindrical but slightly flat bilaterally. However, in the first harpoon, there is a small protruding also present in the middle of the shaft. The one with oblique barbs is 36 cm in length and 840 gm in weight. The other one is broken at the tip; the extant length is 32.5 cm and it weighs about 600 gm.

The second type of harpoon is like a long, narrow leaf with indented margins. These harpoons have short arrowheads, seven or ten pairs of fin-like barbs and midribs on either side running from the tip to the shaft. There is a hole (like a small ring) present on one side of the shaft, right below the last pair of barbs. The shaft is cylindrical. These harpoons are found in bigger and smaller sizes. The former with ten barbs is 36.6 cm in length and weighs about 680 gm. The latter has seven pairs of barbs; it is 21.7 cm in length and weighs about 150 gm. There is another type of harpoon present in this group. It has a long and pointed tip. It is broken at the shaft. However, it too has seven pairs of fin-like barbs. It is very thin; the extant length is 23.4 cm and it weighs about 80 gm.

All these objects are collected intermittently from the rag-collectors. Since the exact find spot are still in dark, no associated materials could be produced here. However, a close scrutiny of these objects indicates that all of them are made in the moulds and reworked subsequently.

Before we get into details of the successive cultures, let us discuss briefly the beginning of excavations at Abhaipur — the location of site, objectives and methods of excavation, the stratigraphy and cultural sequence.

5. Excavations at Abhaipur

The ancient site, popularly known as "Abhaipur-Chena-Naktikhera", is located one kilometre west of the village Abhaipur and about 1.5 km west of the river Deoha (Illus. 2). It is roughly 35 km (by road) east of Bareilly city on the way to Bisalpur (tehsil). The site is situated amid a vast tract of agricultural land and can be approached from the village by a cart route that runs through the site. The site spreads over an area of 350 m x 260 m (8.75 hectares) in north-south and east-west directions. However, now only 130 m x 90 m area is found partially preserved where investigations have been carried out.

The topography of the region is very simple. Apart from the major river Deoha, the land is dissected by a small rivulet which originates a few kilometers north of the site from a pond (once a large reservoir) and forms the eastern boundary of the site. A culvert helps to cross over the rivulet. The topography of the area suggests that the rivulet was much larger in the past than it is today. A brick bridge of British period made over this rivulet near the village Mahadeva preserves ample evidence of its being a larger stream even during the colonial time. So, this could have been the life-line of the ancient settlement at Abhaipur. The people could have found this place much safer to settle down than near the river Deoha, famous for its devastating flash floods. Besides there are two small ponds present in the north-western side of the site. Though the ponds are silted down now, they seem to be quite bigger in size once upon a time.

The Department of Ancient History and Culture, M.J.P. Rohilkhand University, under the supervision of Prof. U.P. Arora and the present author carried out its maiden excavation at the site in three alternate seasons 2001-02, 2003-04 and 2005-06. The principal objectives of excavation were to salvage as much evidence and antiquities as possible through systematic excavations and to identify regional chrono-cultural successions.

The area available for excavation, *i.e.*, the south-eastern part of site, was gridded into 5 m x 5 m squares for surface sampling and excavations. In the first season of excavations (2001-02) three trial trenches (B7, E7 & E12) were taken at different contour levels in order to understand the nature of habitational deposits. All the trenches (2 m x 2 m in size) were dug down to the natural soil. There were no structural evidences; however, a number of floor levels were noted in all the trenches. In trench B7 although partial remains of mud walls were traced, the trench was by and large disturbed due to presence of successive garbage pits. In total, two distinct cultures — painted grey ware and black-and-red ware — were identified. In the lowest level of habitational deposits, a few fragments of highly weathered ochrous potsherds and bits of ochre were noted. The stratigraphy and cultural sequence in main trenches are discussed below.

A "Lot-system" of excavation method was followed. Every quadrant was given separate lot number. All the digs, of three to four centimeters depth, in a quadrant were given successive lot numbers. The materials or samples collected from one dig were given same lot-number. In this method, a database of every three centimeters of the habitational deposit was prepared to have a closer observation of the patterning and distribution of artifacts, technological development and cultural change at a given time and space.

It was clear from the first season's excavations that the area available for investigation is away from centre of actual habitation area. So, what we proposed to excavate here was the garbage or dumping yards of the settlement and it was expected to yield ceramics and bone fragments in large quantity. Therefore, the same Lot-system of excavation was again implemented in the second season in order to document the materials in systematic order. It was also decided to have detail recording of every bone fragment we come across in the trench along with other artifacts.

In the second season (2003-04), three trenches (E3, E4 & F3) were laid out one after other as the excavation progressed. All these trenches (5 m x 5 m in size) were taken in the south-eastern part of the site, adjacent to each other and separated by baulks. However, excavations in none of the trenches were completed in this season. In the third and final season of excavations (2005-06), the trenches E3 and F3 were reopened. Besides, a number of sondages were also taken along the north-south axis of the site in order to understand the nature of habitation in different parts, such as A15, AX9 (NW & SW), AX13 (NE), AX14 (SE), BX13 (NW), BX14 (SW) and IY26 (SE). Other than the trench A15, which was 1 m x 1 m in size, all other trenches were 2 m x 2 m. Most of the trenches were either completely or partially dug down to the natural level. In this season's excavation, presence of Northern Black Polished Ware culture (NBPW) at the site was confirmed, after which the settlement was abandoned.

However, stray finds of sprinkler, narrow-mouthed pots and "V" shaped bowls indicate that the place was not completely deserted but was visited regularly by the people till the Kushan period. It could have been used as a farmstead during this period. This notion is supported by the presence of another settlement close to the river Deoha, on the southern fringe of the village. It suggests shifting of the earlier settlement to this place after the NBPW period. Unfortunately, the site has been completely erased and brought under cultivation. However, the entire area is strewn over with ceramics of Gupta and post-Gupta periods.

5.1. *Stratigraphy and Cultural Sequence*

About 2.5 m (below datum) of habitational deposit divided into six distinct layers was found in the main trenches (E3 and F3) in the south-eastern side. The layers were similar in nature in terms of their composition and cultural association in both the trenches barring slight differences in the thicknesses and some local activities. For example, a thick sterile layer of black soil was found separating layer 2 & 3 of PGW period in the F3 trench. Evidences of black soil deposits were also noted in the trial trench E12. The stratigraphy is also more or less identical in the northern part of the site in trenches AX9, AX13, AX14, BX13 and BX14. However, in this side a thin layer (4) represented the BRW period. A few pieces of ochre and OCW were also noted in the bottom of this layer. The matrix of layer (4) was almost identical with the underlying virgin layer (5) which, however, was devoid of cultural materials. The stratigraphy of trench E3 is described below that represented all the cultural periods (Illus. 3).

5.2. *Trench E3*

Layer-1: The surface layer was about 4-15 cm thick and was comprised of humus and sandy silt soil. It was quite disturbed due to growth of a kind of tall grass, locally called *bhara*, and also for agricultural activities. Grass rootlets, small pottery pieces and bone fragments were found in this layer. Some NBPW potteries along with PGW were also obtained. Besides, there were bangle fragments and some other minor objects of both these periods noted in this layer.

Layer-2: This layer was 63-83 cm in thickness, greyish in colour with very distinct upper and lower limits and was comprised of sandy silt. Moisture level was less in this layer. The layer was quite hard. A number of pits were recorded in the upper part of this layer in the 2003-04 excavations, which were filled up with black soil. Some of these pits were found empty and some yielded bones and potsherds of NBPW period. A lot of potsherds were found embedded in the section along with some bone fragments and brickbats. Some live roots were also noted in it. There were at least four successive compact floors made of yellowish silt found in this layer. Besides, ashy patches and burning activities were also commonly registered. This layer was associated with the PGW culture.

Layer-3: This was a compact, homogeneous layer and was formed of clayey silt. It was 09-38 cm in thickness. Lot of moisture was found in this layer. It was yellowish brown in colour at damp condition and light yellowish colour in dry condition. The upper limit of the layer was very distinct while the lower limit slightly merged with the underlying layer. Some floor levels were also noted in this layer which belonged to the PGW period.

Layer-4: This layer was similar to the previous layer in terms of uniformity, compactness and composition. But it had some percentages of fine sand and was dark yellowish-brown in colour in damp condition. This layer belonged to the BRW culture. Upper limit of the layer merged with the overlying layer-3. This was an undisturbed layer with 08-55 cm in thickness. The layer gradually descended down towards the east from a higher level at the west. The lower limit of this layer was not very distinct. Some disturbances were noticed in this level. Similar situation was also noted in the trench F3. In this trench the layer was found sloping down to the north-western corner from all sides. Perhaps there were rain gullies or gullies formed due to surface erosions in the natural landscape of the site which were filled up by the people of BRW culture.

Layer-5: This silty clayey layer was 14-47 cm in thickness and brownish in colour. It was a compact and undisturbed layer. The layer was quite distinct in terms of colour and composition and was very damp. Some lenses of ashy patches and burning activities were noted in it. This layer also sloped down from western side to eastern side. Some fragments of OCW along with bits and pieces of ochre were noted in this layer. The potteries were very few and the layer was almost devoid of other cultural remains. The ashy deposits noted in the lowest level of this layer were perhaps due to the surface clearing and burning of thickets by the people on their arrival.

Layer-6: This was the virgin layer which yielded only a few stray bone fragments. It was clayey silt in composition, brown in colour and very damp in nature.

Although evidences of four cultural periods were gathered at this site, namely Period-I: Ochre Coloured Ware (OCW), Period-II: Black-and-Red Ware (BRW), Period-III: Painted Grey Ware (PGW) and Period-IV: Northern Black Polished Ware (NBPW) in their stratigraphic order, only the second and third cultures were represented substantially in the excavations. While the habitational area of OCP culture remained elusive at the site, the evidence for NBPW culture was meager. The reason being the entire site was almost brought under cultivation virtually restricting the investigations to the eastern margin of the site.

6. Nature of Different Cultures

6.1. *Period I: Ochre Coloured Ware Culture (OCW)*

Although a thin homogeneous layer containing fragments of OCW along with bits and pieces of ocher were registered in the bottom of all the trenches, the habitational deposit of this culture largely remained out of reach owing to the limited excavations at the site. The layer was very damp, brownish in colour and silty clay in composition. Among the pottery fragments, a red slipped ware is noteworthy, which is devoid of painted decoration. Made of fine grained clay, the ware is well baked and generally comprises jars or jar/pots and dishes-on-stand. Besides, a coarse red ware with rusticated surface is also noted. The evidences seem to be quite similar to that of Hastinapur (Lal 1954-55: 31).

6.2. *Period II: Black-and-Red Ware Culture (BRW)*

Habitational deposit of this culture was noted in layer-4 capping the deposit of OCW culture in all the trenches. Other than some incomplete mud walls, fragments of burnt wattle-and-daub structures and burnt floors, no residential structures were unearthed from the excavations. A partial hearth and a number of burnt patches or thin ashy deposits were found from trench E3 and F3. Presence of burnt brickbats is conspicuous. These were well burnt and at no circumstance can be considered later intrusions. This is because the brickbats of PGW period and the sizes and quality of bricks of NBPW period are different from that of this period. Brickbats in BRW period are also reported from Atranjikhera (Gaur 1983).

6.2.1. *Faunal and Floral Remains:* A lot of animal bones, charred fish bones, small bones and nails perhaps of birds and turtle shells were collected from this level along with bone artifacts like arrowheads and projectile points. An in-depth study of faunal remains is in offing which will allow us to know about the domesticated and wild fauna of the period. Like the sites of Atranjikhera and Lal Quila (Gaur 1983; 1997: 99-100), Abhaipur has also yielded evidence for cultivation of rice (*Oryza sativa*) and barley (*Hordeum vulgare*) in this period. The charred grains have been collected from trench E3 (NE), layer-4 at a depth of 1.21 m.

6.2.2. *Ceramics:* The ceramic industry of this period can broadly be divided into fine and coarse wares on the basis of texture (inclusion size) of fabrics. Most of these wares were made on fast wheel. The fine wares comprised of red slipped ware, black-and-red ware and black slipped ware. The fine red ware can be divided in to soapy and sturdy wares on the basis of fabric characters.

The soapy red ware is treated with brown, brown and black, tan and black slips. In all these varieties, the fabric remains porous and brick red or orange red in colour. The brown slipped ware comprises dishes in large number. Besides, a few dishes-on-stand, jars and basins are also present. It is painted in black or pink colour. The brown-and-black slipped ware is treated with brown colour on the outer surface and black in the inner. This ware is decorated with linear designs in black colour and comprises of different types of dishes. The tan slipped ware has also linear designs painted in black colour and comprises of mainly dishes of different types. A few deep bowls and jars are also noted. The black slipped red ware is a peculiar type of pottery. The ware is light black in colour on the outer surface; however, it gradually becomes dull red towards the rim portion of vessels. The colour of the core is also red at the rim and grey at the bottom. The sturdy and metallic fabric indicates that the ware was made of well-levigated clay and fired at a high temperature. This ware is also painted in black colour. The linear designs are executed on outer, inner or both surfaces of vessels. This particular pottery is not yet reported at any site.

The sturdy red ware has two variants — red slipped and black slipped. The former ware is found in medium to very fine fabric. It comprises deep bowls with flat bases and rudimentary featureless rims and dishes. These vessels are slipped on both sides. The latter, sturdy black slipped red ware, is a red ware treated with a black slip probably after firing. Therefore, the slip has often weathered away and is found in patches. The ware is painted in black colour. The major shapes are bowls and dishes.

The black-and-red and black slipped wares are found in smaller quantity. The former ware has medium fine fabric and is slipped on either side. It comprises of bowls and dishes of different sizes and is generally without any paintings. The latter ware has a very fine fabric and is well baked under reducing condition. The black surfaces of the vessels are often well burnished. The slip has mostly weathered away from the surface. It constitutes different kinds of bowls and dishes.

The Coarse group of ware constitutes sturdy red ware and coarse red ware. The sturdy red ware, as the name denotes has a sturdy fabric; however, it is not well fired. It has rough or rusticated outer surface and smooth inner surface that resembles coconut shells. Some potsherds bear impressions of fingers drawn down the outer surface. White mica particles are observed on the surface. Jars of different sizes are found in this ware; one of which bear a painted band on the neck in black colour.

The coarse red ware has a very coarse fabric and lot of husk impressions on the outer surface. It comprises of jars of different sizes. Most of the vessels are handmade. (Arora *et al.* 2001-02: 122-130).

The presence of a large number of finished and unfinished arrowheads suggests the use of bow and arrow as the main weapon in hunting. Besides, a few hopscotch, perforated discs, birdshots were also found from this period. From trench AX13 a stone blade (?) made of red sandstone was found along with a number of river pebbles and red sandstone fragments.

6.3. Period III: The Painted Grey Ware Culture (PGW)

The habitational deposit of PGW period was easily identified by its light ashy colour, sandy-silt texture and un-uniform nature. However, a thin, light yellowish (brownish), compact layer (layer-3, thickness 9-37 cm) yielding PGW pottery was also noted at Abhaipur (Illus. 3). This layer was found sandwiched between the greyish habitational deposit (layer-2, thickness 63-83 cm) of PGW culture and dark yellowish-brown deposit of the BRW culture (layer-4). A common feature of PGW culture was presence of a large number of pits, which at times disturbed the underlying habitational deposits of antecedent cultures. PGW and BRW cultures shared many identical cultural traits including ceramics.

The people lived in mud houses or wattle-and-daub houses. No complete structure or house was unearthed. The excavations exposed partial remains of mud walls, collapsed walls of wattle-and-daub houses and successive mud-plastered floors. These walls were easily distinguished from the rest of the deposits for their compactness and brownish colour. A lot of burnt clay nodules with reed impressions on them were recovered from the excavations. Some brickbats were though found, they do not seem to have been used for house constructions. The floors were made of very compact yellowish soil, which were easily distinguished from the usual greyish habitational deposits of PGW period. Sometimes black soil was used to level the ground before preparing floors of the houses. No posthole was registered in the excavations. A number of partial remains of hearths with ash and charcoal pieces were noticed on the floors in different trenches. At times, fractured vessels were found embedded in the floors.

6.3.1. Economy: Subsistence and economy of the people were based on agriculture and stock-breeding. People cultivated barley (*Hordeum vulgare*), rice (*Oryza sativa*), wheat (*Triticum aestivum*), urd (*Phaeolus mungo*), khesari (*Lathyrus sativus*), legumes, etc. A large quantity of animal bones (under study) indicates stock-breeding and hunting; fowling and fishing were also used as subsidiary modes of subsistence. A few antlers of deer species were found; some of which bear sharp cut marks. Among the aquatic creatures, fishes were exploited the most followed by turtles and crabs. A lot of charred fish bones of different types and sizes are collected from the excavations. A study is being carried out to identify different species of fishes that were eaten by the people.

In addition to iron/copper metallurgy and pottery manufacturing, trade and commerce also contributed to the economy of the people. The iron objects were found in extremely delicate states. These were very badly preserved and fragmented. The identified objects are arrowheads, knives, chisels, nails and rods. A micro-structure level study of these objects is awaited. Among the copper objects, a few fish-hooks and fragments of bangles are notable. Presence of some semi-precious stone beads of agate, carnelian, jasper and crystal (Illus. 4) throws welcome light on well developed contacts with other neighbouring communities during this period. Besides, the first evidence of glass also comes from this period. The glass bangle fragments of opaque, black colour with irregular thickness were collected in less number.

6.3.2. Bone Workshop: Bone, horn and ivory tool manufacturing was well developed in this period. Bow and arrows were favourite weapons of the people. However, no evidence of bow and shaft of arrows were found. These were perhaps made of perishable materials and therefore, did not survive till the date. A full fledged bone workshop was discovered in trench E3 (Illus. 5). A soil deposit of about 60 cm, reddish in colour, ashy and less compact in nature was found littered with bones of different parts, bone fragments and lots of debitages or bone flakes. Perhaps the place was used as a workshop for a protracted period. A squarish, burnt mud platform with a fireplace in the centre and a brickbat and fragment of a grey ware dish on one side (south-east) was found from this place. Some pieces of charcoal, charred bones, finished and unfinished bone tools and a bead made of bone were also obtained from here. Occurrence of a large number of split bones along with longitudinally split canine, molar and incisor teeth of animals infers that perhaps the sharp split teeth were used as chisels for splitting the long bones. The carpal and tarsal bones were preferably used for tool making. After splitting the bone to a preferable size, the bone marrows were cleverly avoided. Then using a sharp implement the bone fragments were narrowed down to desired shapes. Tools in different stages of manufacture are recovered from all the trenches. The finished tools were polished with sandstone polishers and were heated in the fire for increasing the hardness. One such polisher (17.5 to 19.4 cm x 5.5 to 6 cm x 3 cm) made of sandstone was found from trench BX13. Bone tools like arrowheads and projectile points of different sizes and shapes were manufactured in this method. The styluses (with two pointed ends — one shorter and other longer) mentioned by many scholars as a category of tool might be wrong as these could be unfinished forms of projectile points. The arrowheads (2.1 to 6.6 cm long) are found in two varieties, double-barbed and four-barbed. These are either flat or roughly conical in shape with cylindrical or square distal ends. The tang of arrowhead is cylindrical in shape with a hole for holding the shaft of the arrow. An interesting feature of these arrowheads is two tiny circles engraved one each on either side. Perhaps the circles were symbolic representation of eyes of the arrows which were engraved invariably in every finished bone arrowheads (Illus. 4). There is another kind of arrowhead without barbs and tang. It is shorter in size and conical in shape like a pointed bullet with a hole behind. The projectile points are tanged but devoid of barbs. The tangs are pointed and meant to be fitted into the shafts. These are however devoid of symbolic eyes. Arrowheads and projectile heads are also made in horn cores. Besides, there was a bead, a spatula made of bone and a few ear studs like bone objects, perhaps broken parts of projectile points, were also found from the excavations (Mishra and Arora 2006). The above evidences provide ample idea about a well developed bone industry of the time and a detail study of the technology of bone tool manufacturing of PGW period is in progress.

6.3.3. Ceramic Industry: All potteries of BRW culture remained part and parcel of the PGW assemblage, such as black slipped ware, red slipped ware in plain and painted varieties, black-and-red, coarse red and perforated wares (Illus. 6). The painted grey ware (PGW) along with a plain grey ware was introduced in this period. The PGW is made of well levigated clay and potted on fast wheels. The paintings are linear and geometric designs made in black, orange and red colours. The common vessels are dishes with straight profile and sagger bases, bowls and basins of different kinds, jars, jar/pots, vases and miniature pots and chalices. The plain grey ware has sturdier but less fine fabric than that of PGW. The ware is sometimes treated with a dull grey wash and very rarely painted in black colour. The black slipped ware has a fine, soapy but sturdy fabric. Its glossy surface brings it very close to that of the northern black polished ware. It constitutes a variety of basins, bowls and dishes. The black-and-red ware has a coarser fabric and it comprises of bowls and dishes. The red slipped ware has increased in number; it is sturdier and has medium to fine fabric. It is painted in black and orange colours. The perforated vessels are found with three legs at the bottom. Besides, a channel-spouted bowl in red slipped ware is noteworthy. Presence of a broken terracotta dabber in the assemblage is also significant.

Apart from these, people were using *ghata*-shaped beads of terracotta, glass and copper bangles to embellish themselves. Hopscotch was a good pastime game. A large number of pottery discs were recovered from the excavations. These were found in many sizes starting from a diameter of 2.5 cm to 10 cm at times and were invariably made of all kinds of potsherds. Some of them had single and rarely double perforations in the centre. Some discs were exclusively manufactured of fine clay. These were made in different sizes and thicknesses and intricately decorated with incised designs on the edges before firing. The shapes and sizes of these discs prompt one to relate them with weights (Illus. 4). These discs weigh from 10 gm to 50 gm. A few of them were attempted to be perforated from both sides. Apart from these, terracotta sling balls, birdshots, stoppers and cylindrical objects were collected from the deposits of this period. No religious object or evidence of any such activity was noted from the excavations.

6.3.4. The Burials: The most important findings of PGW culture at Abhaipur are the two burials (Illus. 7). These burials were recovered from the trenches AX13, AX14, BX13 and BX14 in the northern side of the site close to the cultivated land.

The adult burial was at first struck in the north-eastern corner of trench AX13. Here a layer of compact black soil was found under a floor at a depth of 89 cm. Once the soil was removed the ankles along with toes were exposed, which were later traced up to the knees. Since rest of the skeleton was lying inside the unexcavated area, the excavation was extended to three adjacent quadrants. The black soil that covered the burial was literally spread across the trench (Illus. 8). This soil spread was detrimental in finding the exact location of the lining of the burial pit. The body was perhaps interned in a shallow, narrow pit dug into the floor of a house. Therefore, it had acquired slightly curved posture with the waist down and head and legs in little elevated position. It was an extended burial aligned slightly in NE-SW direction. The length of the skeleton was about 170 cm. Lying on its back, the skeleton was slightly tilted towards the right and the head was placed laterally facing to the right. The legs were placed in straight position with the right ankle above the left. The position of legs indicates as if they were tied at the anklets. The pelvis slightly sloped to the right. While the left arm was folded at the elbow and kept on the waist, the right arm was peculiarly folded up at the elbow and placed below the chin (Illus. 10). Some big fragments of potteries were found stacked little away from the waist of the skeleton. When these fragments were refitted a beautiful wide-mouthed, convex-sided bowl of painted grey ware was formed. The bowl, 20 cm in diameter, is painted in orange colour on the outer side and in the inner side only the impressions of the designs can be noticed. The designs are linear in nature. The rim is painted with a thick band of orange colour on the outer side. No other grave goods were found.

As the excavation area was extended to three adjacent quadrants in order to expose the adult burial completely, the child burial was unearthed in the process. It was lying perfectly in N-S direction with the head towards the north, below 56 cm, in the layer-2 of trench AX14. The skeleton was also found below a floor level (Illus. 9). However, it was very poorly preserved. Other than the long bones nothing survived properly. The skull was partially preserved and some of the rib bones were traced. The skeleton was placed laterally lying on its right hand. The legs were in flexed position. The right hand was kept on the waist (Illus. 11). The ankles were totally destroyed by a thick root of a tree, which was found in decomposed condition. A closer observation of the tibia and fibula bones did not show any sharp cut marks, which ensures that the anklets were not chopped off. The length of the skeleton was about 71 cm. A total of 19 teeth were collected. No grave goods were found in this grave.

6.3.5. Morphological and Pathological Study: The height of the adult was five feet eight inches (5′8") and was about 45 to 50 years old at the time of death. The man was long-headed or dolichocranial with cranial index of 69.19 and cranial capacity of 1324 cc. Among the striking features was open metopic suture and a large-sized wormian bone in the lambdoid region are noteworthy. Several age related problems have been identified, such as bone formation on the articular process of sacrum; new bone nodule formation on both patellae; extension of articular surface for talus in R fibula; new bone formation on the edges of articular surfaces of tarsal bones; molar tooth loss (M2); bone growth on right side articular surface of atlas and on the corresponding odontoid process of axis; porosity in third and sixth cervical vertebrae; new bone formation on the superior aspect of body of the 6th cervical; vertebral osteophytosis seen on right side superior surface of L4; severe osteophytic growth in L5; ridge formation near the head neck junction and secondary bone formation in the femurs. The left femur, towards the distal end, has a prominent spur like development which could be neoplastic in origin. The dental pathological study has revealed tartar formation in the mandibular teeth, carries in the maxillar teeth and tooth-decay in maxillar molars.

Age of the sub-adult was about 2 to 2.5 years at the time of death. The preliminary observations of teeth revealed the following facts — crown calcification of maxillar teeth; root formation of 1st incisors was complete; 2nd incisors was incomplete; no root was formed in 1st molar. The radiography of long bones (length 16 cm) showed harris-lines, which indicate the child was malnourished and was ill for longer time (Mushrif-Tripathy *et al.* 2008).

6.4. Period IV: NBPW Culture

At Abhaipur evidence of this culture was very scanty as the surface layer of the site was totally erased by the villagers for agricultural purpose. A very thin habitational deposit of this culture was identified in the trenches E3 and E4. A burnt wattle-and-daub structure was found in trench E4. Besides, two successive floors were also noted in these trenches. A number of pits were found filled with black soil, brickbats and potsherds in this period. This suggests that the uneven surface of PGW period was leveled up by the people in this period to make it inhabitable. The surface was rammed hard and plastered with yellow silt. Generally, in absence of a proper habitational deposit, this culture was identified by the presence of ceramics and other antiquities like fragments of glass bangles, decorated terracotta nut-like objects, *ghata* beads, etc. Some fragmentary iron objects and slag were obtained from this level.

6.4.1. Faunal and Floral Remains: While considerable quantity of animal bone fragments was unearthed from the trenches, the evidence of floral remains was very meagre. The trench B7 (NW), however, has yielded a few charred grains of barley, lentil (*Lens culinaris*) and *Lathyrus sp.*, which provide a partial picture of the agricultural practice in this period.

6.4.2. Ceramics: The ceramics of this period constitute red and black varieties of NBPW, red slipped ware and coarse red ware. The common shapes are bowls, dishes, jars, basins and lids. Narrow-mouthed jar/pots and "V" shaped bowls with flat bases were characteristic features of the associated ceramics. Besides, the very fine, sturdy red slipped ware jars and perforated vessels with three legs were also found.

6.4.3. Glass Bangles: A large number of glass bangle fragments have been gathered from the excavations. These are found in two qualities, opaque (95%) and translucent (5%). The opaque variety occurs in three types, such as monochrome (57%), bichrome (39%) and polychrome (stratified bangles, 4%). The first type is found in two colours—green (in different shades) and black. There are a number of colour combinations noted in the second type, such as yellow band on the green base (or yellow on green), yellow on brown, red on green, red on purple, brown on green, green on brown, dark green on light green, black on brown, and brown on black. The polychrome type is very rarely encountered with following categories, yellow-brown-green, grey-green-light green, etc. The cross-sections of bangles are mostly semi-circular or semi-oval. Besides, roughly triangular, rectangular and rounded varieties are also present. The bangles were not made perfectly circular. The width and thicknesses are also irregular, which varied from 2.5 to 8 mm and 2 to 4.5 mm respectively. The diameter of bangles ranges from less than 4 cm to more than 6 cm (Mishra *et al.* in press).

6.4.4. Brick Well: In trench AX9 a burnt brick well was unearthed. This is the only structural evidence found from the excavations. It was made of semi-baked and wedge-shaped bricks (Illus. 12). The size of the bricks is about 32.5 cm x 22 to 15.5 cm x 8 cm, which almost matches with that of Hastinapur (Lal 1954-55: 106). The bricks are semi-baked, often with dark core, and crumble down with little pressure. The outer and inner diameters of the well were about 1.7 m and 1.05 m. The well was partially preserved and was traced up to a depth of 1.8 m. It was collapsed from the western side. Such brick wells have been called barns in Hastinapur excavation report (Lal 1954-55); may be due to their shallowness. A gold bead was found from this trench outside the well.

7. Chronology

Six radiocarbon dates pertaining to different horizons have been provided by the Birbal Shahni Institute for Palaeobotany, Lucknow as shown in the table. Other than two dates from trench F3, BS No. 2395 and BS No. 2399, all other dates remain beyond the time bracket of the cultures and are either too early or late. Out of these two appropriate dates, the former 2940±140 (3100 BP) represents an early date for PGW culture and the latter 3140±140 (3360 BP) represents the BRW culture (Mishra and Arora 2006).

Table 2

^{14}C Date-range of Abhaipur (Kindly provide the period)

Sl. No.	*Sample No.*	*Layers*	*Period*	*BS No.*	*Age of Sample based on half life=5570±30 yr*	*Uncalibrated Age (Yr BP)*	*Calibrated age range (Yr BP)*
1	E3 (0.96-1.08 m)	3	PGW	2394	3730±260	4090	4440-3700
2	E3 (1.16- 1.21 m)	3	PGW	2397	7000±100	7820	7940-7690
3	E4 (0.51-0.63 m)	2	PGW	2400	3140±140	3360	3470-3170
4	F3 (1.09- 1.14 m)	3	PGW	2395	2940±140	3100 (1100BC- PGW)	3330-2870
5	F3 (1.45-1.61 m)	3	PGW	2393	2310±120	2340	2450-2150
6	F3 (1.85 m)	4	BRW	2399	3140±140	3360 (1360 BC-BRW)	3470-3170

8. Discussion and Conclusion

The excavation at Abhaipur was, by and large, restricted in the non-residential area of the site, which was hardly a case in the earlier major excavations. Evidence of four cultural periods was identified from the investigation. The people of OCP culture were the first to occupy the site, which was actually a natural mound, formed of *bhangar* or older alluvium, about a meter above the ground level. Although the exact location of habitational deposit of OCP culture could not be traced out, it was certain that the people had sanitized the area on their first arrival by lighting up the thickets. This was clearly evident from a thin lens of ash underlying the deposit of OCP culture, which was essentially a riverine deposit interspersed with the washed out OCP fragments and ochre pieces. There was a substantial lapse of time prior to the arrival of black-and-red ware (BRW) people on the scene. Perhaps, the rivulet was quite active during this period and did not allow the people to construct permanent structures in the vicinity. Evidences of river activities prior to the arrival of BRW people were noted from the excavations, such as deposition and erosion of soil or gully formation in the eastern margin of the site. Leveling up of the gullies at some places in this side by filling up with brickbats, potsherds and black soil was noticed in the BRW period. Such kind of natural and human activities were noted in the trenches E12, E3, F3 and IY26. All these trenches marked the boundary of the site along the bank of rivulet. However, later on during the time of PGW period perhaps the river was squeezed up partially due to the active human interference or expansion of settlement due to population growth and also may be owing to the environmental factors, resulting in development of activity areas and accumulation of habitational deposits further closer to the rivulet. It is very clear that the drainage or the rivulet did not suffice the requirement of the people in the NBPW period or immediately after. A number of brick wells were dug up during this time to tap the ground water. Later the settlement was shifted close to the right bank of river Deoha.

There was no break noticed in the settlement between BRW and PGW periods. A cultural continuity can be seen in the material culture and lifestyle of the people. The people of these two periods were basically agro-pastoralists. The enormity of animal, bird and fish bones coupled with large quantities of arrowheads signify that hunting, fowling and fishing were major subsidiary modes of subsistence. People cultivated rice and barley from the BRW period and wheat was introduced in the PGW period. Besides, legumes, *urd* and *khesari* were also harvested. Copper and iron were used in the daily life of the people though in restricted manner.

It has been added to our knowledge that inhumation of dead was prevalent in the PGW period. However, unlike the contemporary late Harappans, no offering was given to the dead. Only a few fragments of a bowl were found near the adult grave. No concrete evidence of ritual was noted. The dead body was interned in NS direction in the residential area and was covered by a heap of compact black soil. Similar method of inhumation was practiced for the sub-adult. The Pathological study indicates that the adult had a natural death and the sub-adult died of ill health.

It should be mentioned here that two human skeletons were also discovered in the sub-Period IB (late Harappa - PGW interlocking) at Bhagwanpura, distt. Kurukshetra, Haryana. The site on the bank of river Saraswati was excavated by late Shri Jagat Pati Joshi in 1975-76 and two cultural periods were identified - Pd IA: Late Harappan and Pd IB: Late Harappa-PGW interlocking (Joshi 1993). According to the excavator there was no noticeable cultural break noted between these two sub-Periods. However, what is interesting in relation to the present discussion is in the manner which these skeletons were discovered. Like Abhaipur, Bhagwanpura skeletons also belonged to an adult (male, 35 years old and height 144 cm) and a child (female, 8-10 years old and height 104 cm). Both the skeletons were inhumed in north-south direction, the head facing towards the north in the habitation area. Lying laterally on their right sides, the skeletons faced to the west, which is identical to that of Abhaipur. While the adult was buried inside a pit, there was no pit outline found in case of the child burial, which is again similar to Abhaipur. The most important evidence which bring these burials to a common cultural platform is the absence of grave-goods.

The above evidences from Abhaipur and Bhagwanpura strongly put-forth prevalence of common burial customs or mortuary practices during the painted grey ware culture hitherto unknown in Indian archaeology, irrespective of the cultural association of the latter skeletons to an interlocking period. The burials were dug in the habitation area as noted at both sites without little or no offering good. DNA analysis of these skeletons would only reveal their genetic relationship.

Although little evidence of the NBPW period was obtained from the excavations owing to the large scale destruction of the site, there was further expansion in the settlement to the west of the site and improvement in the agriculture was attained. Mud bricks and baked bricks were brought into the building processes, as evidenced by the brick wells.

In the survey of Deoha river valley, three OCW, nine early Iron Age, 17 Early Historic and 25 post-Gupta settlements were discovered including some of the sites located on the banks of lesser order streams. The figures signify a steady development of the settlements as well as growth of population in Deoha river valley. It is interesting to note that a few sites, like Abhaipur, were deserted right after the NBPW period but were reoccupied during the post-Gupta period (medieval). These sites are four in number; the site of Abhaipur was though not re-inhabited but was utilized for agricultural purposes. Similarly, there are five sites which were uninterruptedly inhabited from early Iron Age to the post-Gupta period. One of the biggest sites, covering an area of 10.5 acre falls in this category. There are nine sites which were built up during Early Historic period and continued through the post-Gupta period. Only five more sites were newly formed during the post-Gupta period. The sites are located in dispersed manner and no nucleated or clustered sites were noticed. There is no geo-archaeological investigation carried out so far in this region. Therefore, no reason for site formation, desertion and re-occupation can be put forward in the present state of research. The average site size has been shown in the table below.

Table 3

Average Site Size in Different Periods, Deoha River Valley

Sl. No.	*Sites/Cultures*	*Biggest size (ha)*	*Smallest size (ha)*	*Average size (ha)*
1.	OCW & Early Iron Age (1)	8.75	8.75	8.75
2.	OCW, Early Iron Age & post-Gupta (3)	8.4	1.12	5.07
3.	Early Iron Age, Early History & post-Gupta (5)	10.5	1.08	4.29
4.	Early History & post-Gupta (12)	9	1.1	3.73
5	Post-Gupta (5)	3.6	1.2	2.7

Acknowledgement

The author sincerely thanks Dr. Chanchala Srivastava, BSIP, Lucknow, for kindly providing a report on the floral remains of Abhaipur, Prof. R.K. Varma (Chairman, Allahabad Museum) for his valuable guidance as a Joint-Director in the first season's excavation at Abhaipur, the faculties of the Department of Ancient History and Culture, Vice-Chancellor, Registrar and Finance Officer of M.J.P. Rohilkhand University for their kind co-operation. Above all, the author is grateful to Prof. U.P. Arora, Director of Abhaipur excavation, for providing prerequisite space for successful completion of the excavation and for publishing the report of the excavation. Col. Rajiv Rawat (Ramvatika, Bareilly) is thankfully acknowledged for providing the invaluable artifacts of Copper Hoard culture.

BIBLIOGRAPHY

Arora, U.P., R.K. Varma and Anup Mishra 2001-02. Excavations at Abhaipur — A Painted Grey Ware Site. *Puratattva* 32: 122-130.

Buhler, G. 1892. Dewal Prasasthi of Lalla: The Chhinda. *Epigraphia Indica* I: 75-85.

Cunningham, A. 1871 (2000). *Annual Reports of Archaeological Survey of India* I: 352-357. Simla: Archaeological Survey of India.

District Gazetteer of Pilibhit (1911). Government of Uttar Pradesh.

Gaur, R.C. 1983. *Excavations at Atranjikhera*. New Delhi: Motilal Banarsidass.

Gaur, R.C. (ed.) 1994. *Painted Grey Ware*. Proceedings of Seminar on Archaeology held at Aligarh Muslim University, Aligarh. Jaipur: Publication Scheme.

Gaur, R.C. 1997. *Studies in Indian Archaeology and Ancient India*, Vol. 1. Jaipur: Publication Scheme.

Ghosh, A. and K.C. Panigrahi 1946. Pottery of Ahichchhatra. *Ancient India* 1: 37-59.

Indian Archaeology: A Review. Journal of Archaeological Survey of India.

Joshi, J.P. 1993. *Excavation at Bhagwanpura 1975-76 and Other Explorations and Excavations 1975-1981*. New Delhi: Archaeological Survey of India.

Lal, B.B. 1954-55. Excavations at Hastinapur and Explorations in the Upper Ganga and Sutlej Basin 1950-52. *Ancient India* 10-11: 4-151.

Law, B.C. 1984. *Historical Geography of Ancient India*. New Delhi: Munshiram Manoharlal.

Law, B.C. 1999. *Panchalas and Their Capital Ahichchhatra*. Memoirs of Archaeological Survey of India, No. 67. New Delhi: Archaeological Survey of India.

Mishra, Anup and U.P. Arora 2006. Excavations at Abhaipur 2005-06, District Pilibhit, Uttar Pradesh. *Puratattva* 36: 76-84.

Mishra, Anup 2007. Excavations at Abhaipur, District Pilibhit, Uttar Pradesh: Some Preliminary Observations. In *Udayan*, Prof. U.P. Arora Felicitation Volume. A.K. Sinha A.K. Singh (eds.): 470-78. New Delhi: Anamika Publication.

Mushrif-Tripathy, V., Anup Mishra, U.P. Arora and S.R. Walimbe 2008. Anthropological Studies on the Human Skeletons from the PGW Site of Abhaipur (District Pilibhit). *Man and Environment* 33 (1): 80-100.

Pal, Shashibala 2000. *Panchala: Samajik, Arthik Ebam Dharmik Itihas* (in Hindi). New Delhi: Anamika Publication.

Princep, J. 1837. Account of an Inscription found by Mr. H.S. Boulderson in the Neighbourhood of Bareilly. *Journal of Asiatic Society of Bengal* VI: 777-786.

Shrimali, K.M. 1983. *History of Panchala*, Vol. 1: 20. New Delhi: Munshiram Manoharlal.

Singh, Deepak 2004. *Pilibhit Mein Deoha Nadi ki Puratattvik Sarvekshan* (in Hindi). Unpublished M.Phil. Dissertation. Bareilly: M.J.P. Rohilkhand University.

Vajpayee, K.D. 1956. *Ahichhatra*. Lucknow: Shiksha Vibhag, U.P.

G.K. LAMA

Archaeological Exploration in Western Uttar Pradesh: A Brief Report

The present exploration work was conducted by the archaeologists of the Department of Ancient Indian History, Culture and Archaeology, Banaras Hindu University, Varanasi during the summer of 2007 to assess the archaeological potentials of the sites along the rivers Yamuna and Hindon in western U.P. This preliminary survey was focused on revisiting archaeological sites identified in previous surveys and recording their precise geographical location to review their antiquity. These areas were specifically chosen because of their geographical relationship to the present courses of the perennial Yamuna and Hindon rivers (districts Meerut, Baghpat, Ghaziabad and Gautam Buddha Nagar of western U.P.). The prime objective of the present survey is to asses the current stage of knowledge of the Harappan presence in western U.P. and to examine the distribution of regional and non-Harappan sites in the light of recent researches conducted by the ASI particularly at Sanauli (Baghpat) and Mandi (Muzaffar Nagar), U.P. It may be noted that the credit must go to K.A.A. Ansari of A.S.I. for the discovery of Harappan presence in Doab. However, his discovery remains unnoticed until the discovery of Alamgirpur in 1958 and subsequent excavations done by Y.D. Sharma of A.S.I.

We have visited more than two dozen sites, amongst them following are of considerable importance:

Pura Mahadev I (29^0 00′ N: 77^0 27′ E): Situated in district Baghpat, the site is totally covered by the modern village of same name. It extended in 5 acres and extant height of the mound is more than 5 m.

Pura Mahadev II (29^0 00′ N: 77^0 27′ E): This mound is situated in district Baghpat on the right bank of Hindon river, about 3.5 km north from Baleni Bazar on Baleni Pura Mahadev Road. The site is fully occupied by agriculturists, extended in 3 acres with 5m cultural deposit. Red ware vases are scattered all over the mound.

Parshuram Khera (28^0 59′ N: 77^0 27′ E): This ancient site is situated between Pura Mahadev I and II on the right bank of river Hindon in Baghpat district. It is about 3 km from Alamgirpur on Baleni Pura Mahadev Road. The mound is extended in 4 to 5 acres with a height of 10 m. A good number of painted grey ware, grey ware, black-and-red ware and red ware have been recovered.

Alamgirpur (29^0 00′ N: $77^0$29′ E): This Harappan site, situated in district Meerut is totally disturbed. It is extended in more than 3 acres (Illus. 1). Red ware, painted red ware and grey ware were scattered on the mound. A portion of about 50 m is available for trial trench just opposite the trenches excavated by A.S.I., earlier in the year 1958.

Alamgirpur was excavated by Y.D. Sharma of A.S.I. in 1958-59 who revealed cultural sequence of four periods with a break in all of them. Mr. Sharma has divided these periods as Harappan, PGW, Early Historical and very late medieval periods and concluded that, "Any greater chronological precision will be unwarranted" (*IAR* 1958-59: 55). Considering the problem raised by earlier work and new findings in the archaeology of western U.P., new excavations focused on dating the cultural sequence of the site were carried out in May-June, 2008 by the archaeologists of the Department of A.I.H.C. and Archaeology, Banaras Hindu University, Varanasi. The primary aim of this test investigation was to reassess the stratigraphic chronology of the site and to obtain new samples for radiometric dating. These excavations have also provided an opportunity to sample for plant remains and phytoliths, and also to investigate the micro-morphology of the occupation deposits and the underlying old land surface.

During the course of excavation, trenches ZA1 and ZA2 were found disturbed having filled materials of earlier excavation. However, in the trench ZB1, the remains of a wall made up of medieval bricks has been recovered in the highest portion of the surviving mound. In trench ZB2, 12 layers were identified in a cultural deposit of 4.10 m and trench YD2, located in the south-western slope of the mound, recorded a cultural deposit of 3.10 m divisible into 9 layers. Finding of these excavations may be compared favourably with the earlier cultural materials. This excavation revealed that there is no gap between PGW and the Harappans. It has been observed that there was an overlap phase of PGW and Harappans. It appears that there were two phases in Period I representing pit-dwelling activity just over the natural soil followed by mud walls and rammed circular floors with post holes. Other interesting feature of the mature Harappan phase, a series of ritualistic miniature pots were reported in situ. Amongst the other noteworthy findings mention can be made of the occurrence of iron artifacts from the lower level of PGW. Other significant discovery of the PGW period is the cluster of furnaces, perhaps for ceramics production and treatment. It was observed that the inhabitants of this period were familiar with the use of lime. It has been attested by the recovery of lime in huge quantity in the vicinity of floors and the pits adjacent to the furnaces. Further, a number of completed pots (dishes and bowls) were kept found in arranged fashion lying upside down just near the furnaces. Most of the pots were having peculiar painting of mature PGW phase.

The study of the samples collected from the excavations of Alamgirpur is being conducted in collaboration with the University of Cambridge, Deccan College and the Birbal Sahni Institute of Palaeoboatany and the result will be published shortly.

Sirsalgarh (29^0 03′ N: 77^0 23′ E): This site is situated on Baleni Road, 8 km from Aminagar Sarai on the old bed of Krishni in Baghpat district. It extends in an area of 10 acres with average height of about 15 m (Illus. 2). Burnt bricks of different sizes and painted black-and-red ware were scattered on the surface of the mound. No PGW was recovered from this site.

Barnawa (29^0 06′ N: 77^0 25′ E): This mound is located on the confluence of the rivers Krishni and Hindon in district Baghpat, locally known as *Lakshagriha*. It is 35 km from Meerut-Barout Road and 5km from Binauli. The mound extends in an area of more than 15 acres with a height of 30 m. Amongst the cultural deposit mention can be made of red ware, grey ware, burnt bricks with finger impression and a medieval structure (Watch tower/ minar) found on the western portion of the mound.

Isopur Til (29^0 18′ N: 77^0 09′ E): This site is situated on the left bank of the Yamuna river in Muzaffar Nagar district. It is 15 km west from Kandhela via Gangera. It is at least 30 to 40 acres in area and stands to a height of 30 m above the surrounding plain. There are clear signs of PGW culture with painted red ware, black-and-red ware; black slipped ware and plenty of burnt bricks. A probable opening of gate towards east side is also noticed. The site is totally intact and located on the border of Meerut, Baghpat and Muzaffar Nagar. A modern temple of Krishna is constructed on the mound.

Kurdi (29^0 14′ N: 77^0 09′ E): Kurdi is situated on the left flood plain of the river Yamuna, about 9km south-east of Isopur Til. It stands to a height of 30 m above the surrounding plain and extends in more than 20 acres. It is located between Tanda and Chaprauli. PGW, red ware and painted red ware are scattered on this intact mound but painted ceramics are less than Isopur Til. A new temple is constructed on the mound.

Sanauli (29^0 08′ N: 77^0 12′ E): The cemetery site of Sanauli is situated in the Doab region of western U.P. It was discovered in 2004 and excavated by the A.S.I. over two seasons. Major importance of the site is due to unique mixture of copper hoard, OCP and Harappan cultural material found from the graves.

Mandola (28^0 48′ N: 77^0 16′ E): The ancient site of Mandola is situated inside the modern village of same name of the Delhi-Loni-Baghpat Road in district Ghaziabad. A small portion of the mound is surviving which is extended in 4 acres with a height of 15 m PGW and grey ware are present in the lower profile of the section.

Gulistanpur (28^0 31′ N: 77^0 30′ E): It is situated 6 km from Dadri on Dadri-Noeda Road in Surajpur industrial area 'C' in Gautam Buddha Nagar. The site is extended in 6 acres and 5 m high. Black painted red potsherds were collected from the surface of the mound. The site is totally destroyed and presently occupied by the builders.

Buland Khera (28^0 30′ N: 77^0 33′ E): Fully intact mound of Buland Khera is situated on a Nala probably a tributary of Hindon, west from Sakipur village, 10 km from Dadri in the district of Gautam Buddha Nagar. The site rises about 8 m from the surrounding plain and covers an area of 10 acres (Illus. 3), PGW, black-and-red ware, grey ware, black painted red potsherds, a piece of pendent, stone chips and a terracotta dabber were collected from the mound.

Tussiana (28^0 32′ N: 77^0 28′ E): This site is situated near a lake, 15 km from Dadri in Noeda industrial area, district Gautam Buddha Nagar. It extends over in an area of 4 acres, having a 3 m height. The mound is mostly destroyed by modern constructional activities. Amongst the cultural assemblages, mention can be made red ware and painted red ware. Presently a new temple is constructed on the mound.

Kot Gaon: This ancient settlement is situated on the left corner of Dadri-Bulandsahar Road, about 10 km from Dadri town. The mound covers more than 5 acres of the area with extent height of 10 m brick bats, red ware and grey ware are scattered all over the mound. A modern school is constructed on the top of the mound.

Saini (29^0 2′ N: 77^0 47′ E): The ancient settlement of Saini is situated on the left bank of river Kali on Meerut-Mawana Road, 11 km north from Meerut city. The site is fully occupied by the villagers of Saini. It is extended over an area of 5 acres with a height of 15 m. The presence of PGW, grey ware, red ware and Kushan bricks are noted in a south facing section along with a medieval minar on the top of the mound.

Hastinapur (29^0 9′ N: 77^0 0′ E): Having historical importance the site of Hastinapur lies close to the west bank of the Ganges. The main mound was excavated by B.B. Lal in 1954-1955. Most of the mound is currently covered by a dense growth of trees, but there are a number of modern shrines a top the largest mound.

Apart from above mentioned sites the team has visited a few less important sites like Valmiki Mandir, Katha, Loni, Garhi Kalanjari and Habibpur Khera. Valmiki Mandir is situated in district

Baghpat on the right bank of the river Hindon about 25 km west from Meerut on Meerut-Baghpat Road and one km west from the village Baleni. The mound is totally occupied by a temple in which medieval bricks (Lakhauri) are used. The ancient site of *Katha* is totally occupied by villagers and is 6 km far from Delhi-Loni Road on the flood plain of Yamuna in Baghpat district. *Garhi-Kalanjari* is also an ancient site, situated on the right bank of river Hindon in Baghpat district totally covered by a major construction. More than 30 m high mound of *Loni* in Ghaziabad district is also fully destroyed and occupied by the villagers. A new industry is constructed on the mound of *Habibpur Khera* which has completely destroyed the mound. Red ware has recovered from this site, situated in Gautam Buddha Nager.

Apart from visiting excavated sites like Alamgirpur (Meerut) and Sanauli (Baghpat), the sites which have archaeological potentials, are Buland Khera, Sirsal Garh and Isopur Til. There is a great desideratum to compare black painted red ware, which occurs in profusion in the above mentioned recently explored sites, with already reported Harappan sites in neighboring area. Considering the chronological problem, the spread of Harappans and existence of regional cultures prior or contemporary to Harappans in this part of the land, the archaeologists of B.H.U. have conducted excavations in Alamgirpur and Buland Khera in order to reaffirm the chronological sequence and to collect sample for environmental studies and for radiometric dating. Report of the excavation will be published shortly.

BIBLIOGRAPHY

Chakrabarti, D.K., R.N. Singh, Chaudhuri D.K. Lahiri and R. Tewari 2006. Further Thoughts on the Harappan Issue in Western U.P.: Sites in the Saharanpur-Muzaffarnagar-Haridwar Area. *South Asian Studies* 22: 23-25.

Indian Archaeology 1958-59 — A Review: 550-555.

Joshi, J.P., M. Bala and J. Ram 1984. The Indus Civilization: A Reconsideration on the Basis of Distribution Maps. In *Frontiers of the Indus Civilization*. B.B. Lal and S.P. Gupta (eds.): 511-530. Delhi: Books & Books.

Shinde, V., Toshiki Osada, M.M. Sharma, Akinori Uesugi, T. Uno, H. Maemoku, P. Shivalkar, S. Deshpande *et. al.* 2008. Exploration in the Ghaggar Basin and Excavations at Giradwad, Farmana (Rohtak) and Mitathal (Bhiwani District), Haryana, India. Linguistics, Archaeology and the Human Past. Occasional Paper 3: 77-158. Kyoto: RIHN.

Purushottam Singh

Chalcolithic Culture of the Middle Ganga Plain

Though not a clear cut physical unit, the middle Ganga plain (24^{0} 30′ N - 27^{0} 50′ N and 81^{0} 47′ E - 87^{0} 50′ E) stretches for about 300 km from the Himalayan foothills in the north and Vindhyan ranges in the south and covers a large physical area (144,409 sq km). It attained its present form during the post-Tertiary period when this deep trough was filled up by fine alluvium brought down by the Himalayas in the north with an average thickness of 1300-1400 m. In pre-historic times when this deep trough was filled up by fine alluvium brought down by the Himalayas, in the historic times the main river Ganga, watered by several tributaries, flowed sluggishly in meandering fashion forming ox-bow lakes, some of which are perennial. These lakes were rich in aquatic fauna and the land around them was covered with wild grasses, many of which had edible grains. With the onset of milder climate of the Holocene, the marshy land gradually turned into good grassland which attracted small animals.

The middle Ganga plain is bounded by the Ganga-Yamuna confluence in the west and the West Bengal and Bihar border in the east, Himalayas in the north and the Vindhyas in the south. The area includes modern eastern Uttar Pradesh and parts of Bihar. The western and eastern limits of the middle Ganga plain have been demarcated as follows:

"The delimiting line marks the western boundaries of the tehsils of Utraula and Balrampur (Gonda district), Faizabad and Akbarpur (Faizabad district), Sultanpur (Sultanpur district), Patti (Pratapgarh district) and Phulpur and Meja (Allahabad district). As regards the eastern limit of this plain the problem is rather easier. Here natural boundary, *i.e.*, the old Kosi-Mahananda divide very easily solves our problem" (S.C. Singh 1973).

The eastern boundary thus follows the western margin of the Rajmahal Hills and the West Bengal-Bihar state boundary excluding the Kishanganj division.

The Drainage System

The drainage system of the middle Ganga plain is governed by the general life of the land which slopes from the north-west to the south-east. The entire region is drained by the Ganga system. The Ganga is the trunk river of this plain covering a distance of about 2000 km within the alluvial plain. It is a Himalayan source river having a large catchment in the mountains. Emerging out of the Himalayas near Hardwar, the Ganga flows majestically for 1200 km eastwards turns south, then flanks the eastern face of the Rajmahal Hills.

The Yamuna: For the greater part of its course the Yamuna flows between high banks, considerably dissected at places by gulley erosion. It runs for 800 km parallel to the Ganga and joins it at Allahabad, having received a number of tributaries from the central Highlands on its right bank, the Chambal, Sind, Betwa and Ken.

The Ghaghara: The Ghaghara is the recipient of all drainage of the Saryupar west of the Gandak through its tributaries like the Kuwana, the Rapti, the Chhoti Gandak and other smaller ones. It is highly notorious for its floods and changing courses and capacity of rendering vast agricultural tracts into sand flats (R.L. Singh 1971: 191). This behaviour of the river has adversely affected human settlements during the Chalcolithic period. Other streams like the Rapti, although equally notorious, deposit fertile silt and provide highly fertile agricultural tracts.

The Kosi: The Kosi, formed by seven important streams (Sapta-Kosi) in the eastern Nepal, receives no tributary in the plains because of its raised bed; it meets the Ganga at present near a little below Kargola. It is the wildest and most devastative of the Indian rivers, and flows through several capricious channels. It deposits infertile sediments consisting of micaceous sands and renders vast fertile lands into sandy and marshy flats.

This again has deterred pre-historic man from settling in its catchments area.

The Son: The Ganga receives numerous tributaries from the Southern Uplands among which the Son is the largest. The channel of this river is very wide (about 5 km at Dehri), but the flood-plain is narrow, only 3 to 5 km wide. The river has been notorious for its changing courses in the past, as is traceable from several old beds on its east, but has been tamed squarely with the ancient at Dehri and now more so with the Indrapuri Barrage, a few kilometers upstream (R.L. Singh 1971: 196).

Floods: Floods are a recurring feature of the region, more particularly in the northern Ganga plain. Not infrequently, when the Ganga itself remains in spate, and thwarts the incoming water from its numerous tributaries in the region, large areas get flooded leading to breaks of transport system and devastation of life and property.

The Ox-Bow Lakes: A striking feature of the middle Ganga plain, particularly its western section, is the existence of a large number of horse-shoe or ox-bow lakes. A large number of them have been filled up partly by nature and partly by man but many of them still survive. Obviously these lakes were formed by the meander of the Ganga and represent the various stages in the withdrawal of the river to its present channel. In fact, it has been claimed that the Ganga shifted its course some 55 km southward during terminal Pleistocene time. At some places these horse-shoe lake formations have been studied. The available evidence suggests that in the beginning there was very arid climatic condition followed by arid, semi-arid, and semi-humid conditions (Misra and Gupta 1995: 22). These lakes are important, because it was on their banks that the first settlers of the Mesolithic times came and settled, and pre-historic man's life was governed by the ecology of the new sandy alluvial formation and the lakes situated in it.

The Mesolithic Cultures and the Neolithic Interlude

The first effective forays of pre-historic man in the middle Ganga plain were made at the fag end of the terminal Pleistocene and at the beginning of early Holocene period. This stage is known as the Epipalaeolithic (a transitional phase from the Late Upper Palaeolithic to the early Mesolithic). During this stage the Stone Age man from the Vindhyas used to cross the Ganga and Yamuna rivers in the north.

The second phase known as the Mesolithic, constitutes a transitional stage from the Palaeolithic to Neolithic. The Mesolithic sites, characterized by microliths, have been reported, from different ecological zones, across the length and width of the country, excepting from the major portion of the Indo-Gangetic plain and the north-eastern part of India.

In the middle Ganga plain, more than 200 Mesolithic sites have been discovered. They have a fairly dense but discontinuous distribution in Pratapgarh district and sporadic occurrences in Allahabad, Sultanpur, Jaunpur and Varanasi districts. The distribution disparity is probably the result of uneven explorations but could also be due to micro-level environmental differences among the districts concerned.

The chronology of the Mesolithic phase in the Ganga valley is still not firmly established. Two radiocarbon dates obtained from Sarai Nahar Rai on bone samples read 10050±2660±120 BP. It is believed that the former date represents the early phase of the culture. However, a time span of 8000 BC to 2000 BC has been proposed for the Mesolithic phase of the Ganga valley (Pal 2002: 77).

In the mid-Ganga valley, traces of Neolithic culture were found at Sohagaura in the early seventies of the last century. This site is situated on the confluence of the Ami at the Rapti rivers in district Gorakhpur. In recent years Neolithic artifacts comprising a limited number of microliths and the characteristic cord-impressed, hand-made pottery have been found from more than a dozen sites, and of these, Imlidih Khurd and Lahuradeva, have been excavated. The excavation at the last named site has shown, among other things, that paddy was cultivated as early as 5300 BC.

The Chalcolithic Cultures

The discovery of Chalcolithic cultures in the middle Ganga plain is barely four decades old, and this discovery is largely the result of field investigations carried out by the Universities of Allahabad, Banaras, Gorakhpur and Patna and the Departments of Archaeology of U.P. and Bihar states. The Chalcolithic levels were identified first at Chirand in 1968-69 and subsequently at Sohagaura in 1974-75, although the latter site had been investigated earlier also.

As its name implies, the Chalcolithic stage is represented by cultures where Chalcos (copper) was used, (though in limited quantities), along with Lithos (stones) in the form of microliths which were used as parts of composite tools. However, in the middle Ganga plains, the artifacts of copper are very limited and the lithic component is completely missing on sites like Imlidih, Narhan, Khairadih, etc. and wherever it is present (sites of Sant Ravidas Nagar district, Waina in Ballia district and Agiabir in Mirzapur district), their number is exceedingly small and it is not clear if their presence made any significant contribution in the economy of these people.

The Neolithic phase in the middle Ganga plain and the Vindhyas was succeeded by the Chalcolithic cultures. There is no time gap between the two cultures and a gradual evolution from the former to the latter has been witnessed at a number of sites. The excavations at sites like Sohagaura, Imlidih Khurd, Chirand, Chechar and Senuwar have furnished evidence pertaining to the transitional stage from the preceding Neolithic cultures of the region to the Chalcolithic. The only perceptible change during the Chalcolithic is the introduction of copper in this region sometime in the later half of third millennium BC, which resulted into tremendous activity with resulting into agricultural surplus in a big way and the consequent increase in human population. Whereas the Neolithic settlements were few and far between, in the Chalcolithic phase, the number as well as the size of the settlements increased several fold. Exploration carried out in 14,600 sq km area of the middle Ganga plain has brought to light more than 200 sites. Surely, many more sites lie buried and are yet to be documented. Of the explored site, about two dozen have been excavated so far (B.B. Misra 2000: 66). Important among them are Kakoria, Magha, Koldihwa, Khajuri, Banimilia-Bahera, Takiaper, Malhar, Raja Nal-ka-Tila in the Vindhyas and Jhusi, Kausambi, Sringaverapura, Rajghat, Prahladpur, Masondih, Sohagaura, Narhan, Imlidih Khurd, Khairadih, Chirand, Chechar, Maner, Oriup, Champa, Sonpur, Taradih, Manjhi and Senuwar in the Ganga valley. The general features of the Chalcolithic culture in the middle Ganga plain can be listed as follows:

Houses and Settlement Pattern

The Chalcolithic inhabitants lived in wattle-and-daub structures, circular or oval on plan and in houses having mud walls. The Chalcolithic cultures in Bihar have been documented in the excavations at Chirand, Sonpur, Oriup, and other sites. Evidence coming from the first two sites shows that the Chalcolithic people lived in houses made of mud plaster with reeds or bamboos. The 5.50 m thick Chalcolithic deposit at Chirand revealed at its earliest level a circular hearth and post-holes and floors of burnt earth. The exposed lime floors at Sonpur had circular pits representing circular huts, with varying diameters of 1.84 to 2.44 m and with bones of animals and birds inside.

Ceramic Industries

As it has been rightly said, pottery is the alphabet of archaeology and until recently ceramics was considered as a diagnostic trait of the Neolithic culture. However, the discovery of a ceramic stage of Neolithic cultures of western Asia has exploded this myth. In India pottery has been reported from the Mesolithic levels of Chopani Mando, Baghai Khor, Lekhahia Rock Shelter I, Langhnaj and other sites, but it is absent on the Mesolithic sites of Pratapgarh. Pottery appears again in the Neolithic levels at Lahuradeva, Sohagaura and Imlidih Khurd where it is marked by a handmade cord-impressed red ware.

In the Chalcolithic cultures the ceramic assemblage mainly comprises the black-and-red ware, the black slipped ware and the red ware. The pots are usually wheel-thrown, though handmade specimens are also met with. The red ware, the most prolific ceramic industry, is characterized by the bowl, including the lipped and pedestalled varieties, with convex sides and everted rim; convex or straight sided dishes with sagger or flat base; shallow basin including the lipped variety and storage jar. The types in black-and-red ware include the deep carinated, lipped or pedestalled bowl; dish with convex or straight sides and sagger base; small vase, basin, and straight sided troughs. Though in general the pottery is plain but decoration in the form of painting (essentially linear), incisions, and applied patterns are also met with.

In the Saryupar plain the Chalcolithic cultures have been identified at Sohagaura, Narhan, Khairadih and other sites. At all these sites this phase is characterized by the occurrence of black-and-red ware (plain and painted), black slipped ware (plain and painted), red ware (both slipped and unslipped), burnished black ware, cord-impressed pottery and rusticated ware. The last three wares are found in limited number. At Narhan the painted black slipped ware is meagre, the prominent ware being the painted black-and-red ware. About twenty percent sherds in this ware are reported. On the contrary, the painted black slipped ware is the prominent industry at Khairadih (P. Singh 1992: 78).

The ceramic industry at the Chalcolithic sites of Bihar is represented by kiln-burnt plain and painted black-and-red, black, steel grey and red wares. The pottery, of sandy clay and porous section, is both wheel turned and handmade and has a thick slip over it. The early specimens of Sonpur are brittle and too small to indicate any shape, but the types at Chirand include dish-on-stand, long-necked jar, lipped bowl, basin, bowl with ring base, spouted vessel, four-legged and ring-based perforated pot in black-and-red ware; and high-necked jar, lipped bowl, basin, bowl with ring base, spouted vessel, *lota* with corrugated shoulders in black slipped ware. Generally bowls and dishes bear painted designs comprising groups of wavy and straight lines or dashes executed in white on black surface.

The Small Finds

The negligible occurrence of copper objects which include a few small corroded pieces from Sonpur and Chirand, a bead from Chirand and a bangle piece from Oriup reflects the scarcity of the metal. Microliths from the sites are represented by cores, waste flakes, blades and numerous small nodules on carnelian, chalcedony, quartz and chert. The appearance of iron in the uppermost Chalcolithic levels of Sonpur and Chirand is significant. A similar stratigraphic position is obtained at Narhan also.

The other associated finds from Sonpur and Chirand include tanged and socketed arrowheads having circular or square section and pins of bone, arrowheads of ivory and styli of both materials. Besides, there are terracotta beads, some pear-shaped and some others with incised decorations, beads of steatite, chalcedony, etc. balls, pestles and querns of stone, bones of birds and fish and a few Neolithic celts from Chirand.

The post-cremation circular pit-burials at Sonpur and suspected such burials at Chirand are noteworthy (Roy 1989a: 99). The Sonpur burials having diameters of 1.82 to 2.12 m and a depth of 91 cm and containing ash, charred bone pieces and sherds of black, red and black-and-red wares and a handmade jar with 5 kg of charred rice, suggest that the people burnt their dead and buried their charred bones, and also cultivated rice.

Among the noteworthy small antiquities found at Khairadih, Narhan and Sohagaura constituted beads of agate, chalcedony, carnelian, jasper, steatite, socketed and tanged arrowheads of bone, points, pottery discs, etc. Terracotta beads decorated with incised designs are common to both Khairadih and Sohagaura. At Khairadih the use of glass is attested by the presence of a micro-bead of blue glass (P. Singh 1997: 79), while at Narhan a polished celt is reported. The presence of a socketed copper arrowhead, an indeterminate object, a rod and a copper piece respectively found at Khairadih, Narhan and Sohagaura suggests the scarce use of the metal. A noteworthy point which needs our attention is the complete absence of lithic tools at these sites which is considered an essential Chalcolithic appellation (P. Singh 1992: 76).

Agricultural Background of the Chalcolithic People

A good quantity of archaeo-botanical remains obtained by flotation from a number of sites give a fair idea of the agricultural practices of the Chalcolithic people. Such evidence comes mainly from Lahuradeva, Imlidih Khurd, Narhan, Senuwar and Chirand.

The archaeo-botanical remains from Imlidih Khurd comprised rice, barley, wheat, *jowar* millet and *bajra* (pearl millet). The pulses included, lentil, field pea, grass pea (*khesari*) and green gram or *mung*. The oilseeds comprised field brassica and sesame or *ti1*. Jujube, *awla* and grapes were the fruits eaten by the inhabitants.

Recovery of grains by floatation from the Chalcolithic levels at Senuwar indicates that agriculture was practised on a large scale. The study revealed that the subsistence economy of Chalcolithic Senuwarians depended mainly on agriculture, cattle-breeding, hunting and partly on some cottage industries which included pottery making, lapidary, bone tool making and faience industry. As the detailed report on the excavations at Senuwar has just been published (B.P. Singh 2004), we get a detailed account of their agricultural practices which are as follows:

Stage IA: Early Neolithic (circa 2200 BC - 2000 BC)

The economy of this stage was marked by domestication of animals and incipient farming which included the cultivation of only *Oryza sativa* variety of paddy. The latter fact is rather surprising as only rice was cultivated at Senuwar in the Neolithic period while in the middle Ganga plain multiple crop raising is evident from all the early Neolithic horizon. The domesticated animals comprise cattle, buffalo, sheep, goat and pig (Sathe and Badam in B.P. Singh 2004). Deer, antelope, barking deer and *nilgai* were hunted but their contribution in the Neolithic food economy was marginal.

Stage IE: Late Neolithic (circa 2000 BC - 1950 BC)

This stage is marked by a major shift in the agricultural practices and consequently in the economy. The new cereals included barley, wheat, *jowar* millet, lentil, field-pea, finger millet (*ragi* and *khesari*). This shows that agriculture now played a major role in the economy.

Stage II: Neolithic-Chalcolithic (circa 1950 BC - 1300 BC)

This stage has been designated Neolithic-Chalcolithic as metal (copper) appears for the first time during this stage. This stage witnessed an overall advancement in the living pattern. In the field of agriculture, new cereals and pulse crops were introduced. These comprise bread wheat, *kodon* millet, green gram/*mung*, horse-gram, *kulthi* and chick pea/gram. The faunal complex now included some more wild species of animals like wolf, four-horned antelope and *chital* along with the species found in Period IA. Besides, various craft such as clay moulding, lapidary, chiselling of bone, shell and stone show gradual refinement and the high proficiency in bead making at Senuwar remind one of Harappan craftsmanship. But the most important contribution of this period was the introduction of metal (copper). As many as 19 objects made of pure copper (99%) were recovered from the limited excavations. The introduction of this metal helped in the development of various crafts and the increased prosperity led to interaction and trade with other regions. Beads and pendants of marine shells *Turbinella pyrum* (Linn.) found at Senuwar were probably imported from the Gulf of Kutch and copper was obtained from the Rakha mines and lead from Bhagalpur district of Bihar (B.P. Singh 2004: 609).

Stage III: Chalcolithic (circa 1100 BC - 7th century BC)

This stage of techno-cultural development is characterized by production of bronze objects, improvement in agriculture and introduction of plain and painted pottery comprising black-and-red ware and other associated ceramic industries. Several new shapes in pottery forms were introduced, noteworthy among them are dish-on-stand, bowls of varying shapes and capacity, vessels with long vertical sides and dish. The appearance of the last-named pottery form suggests a change in the food habits of the people.

This stage also witnessed the evidence of alloying (tin around 5%) which may be considered a technological advancement over the preceding stage. Now the economy of the Chalcolithic Senuwarians depended mainly on agriculture, cattle breeding, hunting and partly on some cottage industry which included pottery making, lapidary, bone tool making, etc. In the realm of agriculture, a new pulse crop, the moth bean was added and the cultivation of til, field *brassica*/brown mustard, safflower, linseed/*alsi* and castor was started. Besides, orchard husbandry began to be practiced. Water melon seeds, mango and jack fruit have been reported from this period. Thus the agricultural base of the Ganga valley was laid down by the pre-iron farmers and no new crops were added after the introduction of iron (Chakrabarti 1988: 73).

At Narhan grains of hulled and six-row barley (Hordeum vulgare), club wheat (*T. compactum*), bread wheat (*T. aestivum*), dwarf wheat (*T. sphaerococcum*) and cultivated rice (*Oryza sativa*) have been identified from the Chalcolithic levels. The pulses include pea (*Pisum sativum*), green gram (or *moong*: *Vigna radiata*), gram/chickpea (*Cicer arietinum*), khesari (*Lathyruis sativus*), besides mustard oilseeds and flax/linseed. Seeds of jack fruit (*Artocarpos integrifolious*) found from these levels is an important discovery. Jackfruit grows wild in the western *ghats* and it was taken to cultivation in north India.

The present evidence suggests that the Narhan inhabitants cultivated it for its fruit.

Other Sites

Preliminary observation to identify the grains obtained from Tokwa by floatation include rice, barley, *til* and *moong*. Some fruits and beans were also found. The analysis and identification of animal species is under process.

Archaeo-botanical remains were collected from Raja Nala-ka-Tila in district Sonbhadra. A preliminary examination of these samples showed that the earliest settlers of Period I (Chalcolithic) had sufficient experience of agriculture and they cultivated rice, barley, lentil, field pea, *ragi* millet and fox-tail millet, besides *khesari* and *moong*.

The presence of *ragi* and fox-tail millet in the collection indicates that the inhabitants of Raja Nal-ka-Tila gave due consideration to their ecological surroundings. These millets require little water and can thrive on the soil too poor for other cereals. Double cropping, *i.e.*, rice in rainy seasons and lentil, pea, etc. in the winter, was practiced in the inundated area of river Karamnasa.

Concluding Remarks

(1) As compared to the preceding Neolithic culture, there is a dramatic increase in the number and size of the Chalcolithic sites. Obviously, this was due to a sharp increase in population. The social structure of the Chalcolithic folk has not been worked out in detail because the excavations at most of these sites were conducted on a very modest scale. Some sort of stratification in society during the Mesolithic period has been suspected on the basis of grave-goods from Mahadaha. A similar situation must have obtained in the Chalcolithic society as well. The presence of various types of ceramic wares and small objects of stone, bone, ivory, etc. indicates the specialization of crafts by certain individuals/families in the Chalcolithic society.

(2) We do not have any indication about inhabitants of the middle Ganga plain. It may be recalled that "a place of worship" has been identified in the excavation of Bagor in district Sidhi in Madhya Pradesh. This place of worship has been dated to the upper Palaeolithic period. Further, the discovery of a figurine of a Mother Goddess made on bone and found from the eroded Gravel III in Lohanda Nala, a tributary of the Belan river has been dated to the upper Palaeolithic period. It provides the earliest evidence of a belief in the supernatural. The burials of the Mesolithic sites of Pratapgarh provide ample evidence of belief in the after-life, but no such evidence is forthcoming from the Chalcolithic sites. The only evidence is that of post cremation pit-burials from Sonpur and Chirand which indicate that this custom was prevalent on some sites in Bihar but this evidence is missing on other sites. The absence of burials in the Chalcolithic levels indicates that the method of cremation for the disposal of the dead body, which became the principal mode in the latter-day Hindu Society, had its roots in the Chalcolithic culture.

(3) The archaeo-botanical remains from Imlidih, Narhan and Senuwar have been studied in quite a great detail. This study indicates that by about 2000 BC almost all cereals, pulses and oilseeds which form the staple food of the present day inhabitants of the middle Ganga plain

were grown in this region. The only serious omission is the pegeon-pea (*arhar*), which is presently missing from the archaeological record.

(4) The faunal remains obtained from these excavations have not received adequate attention except in the case of Senuwar and Narhan. Bones of domestic cattle, buffalo, sheep, goat, pig and dog have been reported from Senuwar. Among the wild fauna from this site mention may be made of antelope, spotted deer, *nilgai*, four horned antelope, barking deer and wolf (Sathe and Badam, in B.P. Singh 2004). The bones of humped Indian cattle, sheep, goat and horse have been reported from Narhan. A tentative taxonomic classification of animal bones from Imlidih shows that cattle, sheep, goat and presumably pig had been domesticated in Period I.

(5) An insight into the economic activity of the Chalcolithic inhabitants has been provided by the 'site catchment analysis' in the case of Senuwar. A catchment area is that area from which resources are taken to support human populations and occur within reasonable walking distance from a site. From this study it has been shown that several resources were available within and in the close vicinity of the ancient site such as clay for pottery and terracotta objects, house building materials, domestic animals, fishes and other domesticated animals. The arable land around this site was quite sufficient for agriculture. However, the raw material for preparing the lithic blades (agate, chalcedony, jasper, milky-quartz, etc.) was obtained from a distance of 8 to 9 km, from the foothill portion of the Kaimur Hill ranges. A similar situation must have obtained on other Chalcolithic sites also.

(6) Analysis of copper objects from Senuwar (R.N. Singh 2004: 597) shows that the coppersmiths of this site had definitely started smelting copper ores since 1950 BC - 1300 BC (Neolithic-Chalcolithic) for procuring metallic copper. The trace element analysis of Senuwar specimens suggests that the source of copper was Singhbhum copper belt of Bihar, particularly the Rakha mines. The metallurgical analysis of a copper axes from Imlidih Khurd is under progress.

(7) Excavations at Raja Nala-ka-Tila, Malhar and Dadupur have provided quite early dates for the introduction of iron in the middle Ganga valley. A number of radiocarbon dated from these sites put the introduction of this metal to about 1600 BC, if not earlier. This is a new development which has wider ramifications and the stratigraphic position of this metal in future excavations needs to be watched carefully.

(8) The introduction of metal (copper) witnessed a spurt of activities in every walk of life and a significant increase in the settlement. These sites are found below the 90 m contour line and are located on higher *bhangar* land which is above the flood level. These sites are almost always found along the river banks. Of the nearly 200 sites, 13 have been excavated. The radiocarbon dates from Sohagaura, Khairadih, Narhan, Chirand, Sonpur and Senuwar indicate that Chalcolithic cultures were firmly established around 2000 BC on sites in Bihar and by about 1500 BC in the Saryupar plain.

(9) While the economic base of the Chalcolithic culture of the lower Ganga plain was mainly based on rice cultivation, the staple food of the Chalcolithic cultures of the middle Ganga plain (including the Saryupar region) comprised rice as well as wheat and barely. Here we find that the cultivation of two crops a year was already firmly established during the Chalcolithic period and almost all the cereals which were the staple food of the urban settlements of the Harappa culture in the north-west, were being cultivated by the Chalcolithic people.

(10) The radiocarbon dates from Neolithic-Chalcolithic sites of the middle Ganga plain have conclusively proved that these cultures are a younger contemporary of the Harappan culture. Here the natural question arises as to whether the Chalcolithic people were in contact with this mighty city civilization. The discovery of more than one hundred tiny beads of steatite from the pre-Narhan deposits at Imlidih Khurd and several steatite beads from Chirand do provide an indication of such a contact, but this remains to be firmly established by further research.

(11) On the basis of archaeo-botanical evidence Saraswat believes that, as the Harappan trade with Mesopotamia declined around 2000 BC, the late Harappan people migrated from their homeland to different regions and some of them came to the Kaimur region. From the Kaimur region the tradition spread in inland regions of the middle Ganga plain and a number of sites like Chirand, Taradih, Maner and Chechar-Kutubpur are a testimony to this (B.P. Singh 2004: 607). Harappan influence has also been noticed by some scholars in the pottery types of this period. The bottomless goblet, dish-on-stand and knobbed ware from Chirand (Roy 1989b) are taken as further proofs of this east ward migration of the late Harappans.

(12) The discovery of well established village cultures based on the cultivation of two crops a year by rotation method in eastern U.P. and Bihar demonstrators an uninterrupted cultural continuity uninfluenced by any external stimuli from about *c.* 2000 BC in Bihar and from *c.* 1600 BC in the Saryupar plain. This discovery has exploded the popular theory that this part of the country was 'Aryanised' by clearing dense forests only around the eighth to seventh centuries BC as proposed by some scholars; while giving a historical explanation of the "Videgha Mathava Legend" of the Satapatha Brahman.

BIBLIOGRAPHY

Chakrabarti, D.K. 1988. Theoretical Issues in Indian Archaeology. Delhi: Munshiram Manoharlal.

Chattopadhyay, P.K. 1991. Ancient Iron Smelting Technology in West Bengal. In *Studies in Archaeology*. Papers presented in memory of P.C. Dasgupta. A. Datta (ed.): 167-172. New Delhi: Books & Books.

Chattopadhyay, P.K. 1992. *Archaeometallurgy in India: Studies in Technoculture in Early Copper and Iron Ages in Bihar and West Bengal*. Ph.D. Thesis (unpublished). Patna: Patna University.

Dasgupta, P.C. 1964. The Excavations of Pandu-Rajar-Dhibi. *Bulletin of the Directorate of Archaeology, West Bengal*, No. 2.

Ghosh, A. (ed.) 1989. An Encyclopedia of Indian Archaeology. New Delhi: Munshiram Manoharlal.

Ghosh, N.C. and S. Chakrabarti (eds.) 1990. *Adaptation and Other Essays*. Santiniketan: Vishva Bharati Research Publication.

Ghosh, N.C. 1987. The Chalcolithic Background of West Bengal. In *Indian Studies*. Amita Ray *et al.* (ed.): 15-19. New Delhi: Books & Books.

Hoque, M. 1993. *Pre and Protohistoric Settlement Patterns of the Middle and Lower Ganga Valley*. Ph.D. Thesis (unpublished). Pune: Deccan College.

Mishra, B.B. 2000. Chalcolithic Cultures of the Northern Vindhyas and the Mid-Ganga Valley. In *Peeping Through the Past*, Prof. G.R. Sharma Memorial Volume. S.C. Bhattacharya, V.D. Misra, J.N. Pandey and J.N. Pal (eds.): 66-85. Allahabad: University of Allahabad.

Misra, V.D. 1999. A Brief Note on Indian Stone Age Archaeology. In *The Dawn of Indian Civilization (upto c. 600 B.C.)*, Vol. I, Part I. G.C. Pande (ed.): 233-266. New Delhi: PHISPC.

Misra, V.D., B.B. Mishra, J.N. Pal and M.C. Gupta 2000. Explorations at Tokwa: A Neolithic-Chalcolithic Settlement on the Confluence of the Belan and Adwa Rivers. In *Peeping Through the Past*. Prof. G.R. Sharma Memorial Volume. S.C. Bhattacharya, V.D. Misra, J.N. Pandey and J.N. Pal (eds.): 45-57. Allahabad: University of Allahabad.

Misra, V.D. and M.C. Gupta 1995. Pre-NBPW Cultures in the Mid-Ganga Valley. In *Prof. Agam Prasad Mathur Felicitation Volume*, Vol. III. R.P. Verma *et al.* (eds.): 21-34. Agra: Hazuri Bhavan.

Misra, V.D. and J.N. Pal (eds.) 2002. *Mesolithic India*. Allahabad: University of Allahabad.

Misra, V.N. 1972. Burials from Prehistoric Bagor, Rajasthan. In *Archaeological Congress and Seminar Papers*. S.B. Deo (ed.): 58-65. Nagpur: Nagpur University.

Misra, V.N. 2001. Prehistoric Human Colonization of India. *Journal of Biosciences* 26 (4): 491-531. Supplement.

Misra, V.N. 2002. Keynote Address. In *Mesolithic India*. V.D. Misra and J.N. Pal (eds.): 1-66. Allahabad: University of Allahabad.

Pal, J.N. 1985. Some New Light on the Mesolithic Burial Practices of the Ganga Valley: Evidence from Mahadaha, Pratapgarh, Uttar Pradesh. *Man and Environment* 9: 28-37.

Pal, J.N. 1986. *Archaeology of Southern Uttar Pradesh*. Allahabad: Prabhat Prakashan.

Pal, J.N. 1992. Mesolithic Human Burials in the Ganga Plain, North India. *Man and Environment* 17 (2): 35-55.

Pal, J.N. 1994. Mesolithic Settlements in the Ganga Plain. *Man and Environment* 19 (1-2): 91-101.

Pal, J.N. 2002. The Mesolithic Phase in the Ganga Valley. In *Recent Studies in Indian Archaeology*. K. Paddayya (ed.): 61-80. New Delhi: Munshiram Manoharlal.

Pandey, J.N. 1985. Settlement Patterns and Life in the Mesolithic Period in Uttar Pradesh. D.Phil. Thesis (unpublished). Allahabad: University of Allahabad.

Pandey, J.N. 1990. Mesolithic in the Middle Ganga Valley. *Bulletin of the Deccan College Post-Graduate and Research Institute* 49: 311-316. Pune: Deccan College Post-Graduate and Research Institute.

Ray, Amita 1990. Archaeology of Mangalkot. In *Historical Archeology of India: A Dialogue between Archeologists and Historians*. A. Ray and S. Mukherjee (eds.): 131-140. New Delhi: Books & Books.

Roy, S.R. 1989a. Middle Ganga Region. In *An Encyclopedia of Indian Archaeology*, Vol. I. A. Ghosh (ed.): 98-99. New Delhi: Munshiram Manoharlal.

Roy, S.R. 1989b. Chirand. In *An Encyclopedia of Indian Archaeology*, Vol. II. A. Ghosh (ed.): 103-105. New Delhi: Munshiram Manoharlal.

Saraswat, K.S. 1993. Seed and Fruit Remains of Imlidih Khurd, Gorakhpur: A Preliminary Report. *Pragdhara* 3: 37-42.

Sharma, G.R., V.D. Misra, D. Mandal, B.B. Misra and J.N. Pal 1980. From Hunting and Food Gathering to Domestication of Plants and Animals - Epi-Palaeolithic to Neolithic - Excavation at Chopani Mando, Mahadaha and Mahagara. *History and Archaeology*, Vol. I. Allahabad: University of Allahabad.

Sharma, G.R., V.D. Misra, D. Mandal and J.N. Pal 1980. Beginnings of Agriculture. Allahabad: Abinash Prakashan.

Singh, B.P. 2004. *Early Farming Communities of the Kaimur (Excavations at Senuwar)*. Jaipur: Publication Scheme.

Singh, I.B. Shikha Sharma, Maneesh Sharma, Pradeep Srivastava and Govindaraja Rajagopalan 1999. Evidence of Human Occupation and Humid Climate of 30ka in the Alluvium of Southern Climate Plain. *Current Science* 76 (7): 1022-1026.

Singh, I.B. 2001-2002. Late Quaternary Evolution of Ganga Plain and Proxy Records of Climatic Change, Neotectonics and Anthropogenic Activity. *Pragdhara* 12: 1-25.

Singh, I.B. 2004 Palaeoenvironments and Anthropogenic Activity in the Quaternary of Ganga Plain. Paper read in the seminar on '*The Archaeology of the Middle Ganga Plain*', 13-14 March, 2004. Lucknow.

Singh, P. 1991-92. Excavation at Imlidih Khurd. *Puratattva* 22: 120-122.

Singh, P. 1992. Neolithic-Chalcolithic Cultures of Eastern U.P. In *Archaeological Perspectives of Uttar Pradesh and Future Prospects*, Part I. Rakesh Tewari (ed.): 67-76. Lucknow: U.P. State Archaeological Organisation.

Singh, P. 1992-93. Archaeological Excavations at Imlidih Khurd - 1992. *Pragdhara* 3: 21-35.

Singh, P. 1993-94. Further Excavations at Imlidih Khurd - 1993. *Pragdhara* 4: 41-48.

Singh, P. 1999. Rise of Cultures in Eastern India. In *The Dawn of Indian Civilization (up to c. 600 B.C.)*, Vol. I, Part I. G.C. Pande (ed.): 509-529. New Delhi: PHISPC.

Singh, P. and A.K. Singh 1995-96. Trial Excavations at Waina, District Ballia (U.P.). *Pragdhara* 6: 41-61.

Singh, P. and A.K. Singh 1997-98. Trial Excavations at Bhunadih, District Ballia (U.P.). *Pragdhara* 8: 11-29.

Singh, P. and A.K. Singh 2004. *The Archaeology of Middle Ganga Plain: New Perspective (Excavations at Agiabir)*. New Delhi and Shimla: Aryan Book International and Indian Institute of Advanced Study.

Singh, R.L. (ed.) 1971. *India: A Regional Geography*. Varanasi: National Geographical Society of India.

Singh, R.N. 2004. Analysis of Metal Objects. In *Early Farming Communities of the Kaimur (Excavations at Senuwar)*. B.P. Singh (ex. & ed.): 588-600. Jaipur: Publication Scheme.

Singh, S.C. 1973. *Changes in the Courses of Rivers and their Effects on the Urban Settlements in the Middle Ganga Plain*. Varanasi: National Geographical Society of India.

Singh, S.K. 2000-2001. Lithic Industries of Waina, District Ballia, U.P. *Pragdhara* 11: 105-107.

Stamp, Sir Dudley 1967. *Asia: A Regional and Economic Geography*. London: Methuen.

Tewari, Rakesh, P.C. Pant, I.B. Singh, S. Sharma, M. Sharma, P. Srivastava, A.K. Sanghvi, P.K. Misra and H.J. Tobschall 2002. Middle Palaeolithic Human Activity and Palaeoclimate at Kalpi in Yamuna Valley, Ganga Plain. *Man and Environment* 27 (2): 1-12.

Tewari, Rakesh, R.K. Srivastava, K.K. Singh, K.S. Saraswat and I.B. Singh 2002-2003. Preliminary Report on the Excavations at Lahuradeva, District Sant Kabir Nagar, U.P. 2001-2002: Wider Archaeological Implications. *Pragdhara* 13: 37-68.

Tiwari, Rakesh, R.K. Srivastava and K.K. Singh 2000. Excavations at Lahuradeva, District Sant Kabir Nagar, Uttar Pradesh. *Puratattva* 32: 54-62.

Tiwari, Rakesh, R.K. Srivastava, K.K. Singh, Ram Vinay, G.C. Singh and Rajiv Trivedi 2004. Recent Archaeological Excavations in the Middle Ganga Plain and North Vindhyas. Paper read in the seminar on *'The Archaeology of the Middle Ganga Plain'*, 13-14 March, 2004. Lucknow.

Vishnu-Mittre 1972. Neolithic Plant Economy at Chirand, Bihar. *The Palaeobotanist* 21 (1): 18-22.

RAKESH TEWARI

Changing Dimensions of Pre-Iron Age Cultures of the Middle Ganga Plain

Middle Ganga plain, generally described in archaeological literature as a sub-division of the Ganga plain, extends from Ayodhya-Jhusi axis to the eastern margins of the Rajmahal Hills. It is located roughly between 24^0 30′ & 27^0 46′ N and 81^0 47′ & 87^0 50′ E and covers the area of about 1,44,409 sq km. Main rivers of this area emanating from Himalayas directly meet the Ganga and those from Vindhyas meet either Yamuna or Ganga. Considering the higher annual rainfall (900-1200 mm), as against 900 mm of lesser annual rainfall in upper and much higher annual average rains (2000 mm) of lower Ganga plain, it is marked as a distinct geo-unit. Middle Ganga plain may further be sub-divided into: 1. Saryupar (between Himalayan Terai in the north, Saryu in the west and south and Gandak in the east); and 2. Saryu-Ganga Doab in eastern Uttar Pradesh; 3. Gandak-Kosi, 4. Kosi-Mahananda Doab in north Bihar, and 5. Alluvial tract extended between the Ganga and Vindhya-Chotanagpur Hills in U.P. and Bihar. The last sub-division may further be sub-divided into Tamsa-Karamnasa (west of Karamnasa), Karamnasa-Son (east of Karamnasa) and east of Son (Magadh-Anga plain) (Singh R.L. 1971; Misra 2006).

Changing dimensions of the Pre-Iron Age Cultures of the Middle Ganga Plain are discussed below in brief from the calendar years 1956-1957 in chronological order followed by an attempt to underline their salient features.

A. 1956-57 to 1969-70

1. In the earlier half of the twentieth century the antiquity for the appearance of iron in the middle Ganga plain was being generally placed around 800-700 BC. V.K. Misra of the K.P. Jayaswal Institute, Patna was the first to mark the presence of a pre-800 BC cultural phase at Sonepur (district Gaya, Bihar) in 1956-57 and suggested a time span of 1000-850 BC for it (*IAR* 1956-57: 19-20).

2. Subsequently, excavations carried out at other sites in Bihar and Uttar Pradesh also revealed pre-800 BC deposits. In the Saryupar plain, at Sohagaura about 1.60 m thick pre-NBPW deposit came to light during the excavations carried out under the leadership of G.C. Pande (*IAR* 1961-62) of the Gorakhpur University.

3. B.S. Verma and L.A. Narain (*IAR* 1962-63) of the Department of Archaeology and Museums, Government of Bihar unearthed three pre-NBPW cultural phases at Chirand (district Saran) during 1962-63. Thereafter, excavations were continued at this site for many seasons (*IAR* 1968-69: 5-6, 1969-70: 3-4, 1971-72: 6-7, 1972-73: 7-8, 1980-81: 9-10, 1981-82: 13, 14).

4. Between 1962-1965 excavations at Prahladpur, district Varanasi by A.K. Narain, *et al.* (*IAR* 1962-63: 41), Mason, district Ghazipur by R.B. Narain (Sanskrit University, Varanasi) (*IAR* 1964-65: 42, 1965-66: 49-51, 1967-68: 46-47, 1970-71: 38-39), Oriup (district Bhagalpur) by B.P. Sinha and R.C.P. Sinha, Patna University (*IAR* 1966-67: 6-7) and Sarai Mohana and Kamauli (*IAR* 1963-64: 58) district Varanasi by T.N. Roy and B.P. Singh (BHU) (*IAR* 1967-68: 48) also revealed pre-NBPW assemblages.

5. By the end of 1970 nine excavated sites containing pre-NBPW cultural deposits were known in the middle Ganga plain. Apart from that on the basis of surface finds and comparative considerations several other sites were placed in this cultural phase. This was the time, when V.D. Misra reviewed the status of the evidence emerging from these excavated and explored sites and placed this phase under the appellation of Chalcolithic cultures (Misra 1970). The use of black-and-red ware, microliths with crested edge blades and familiarity with potters were underlined by him as some of the unifying factors of these cultures. Bone industry comprising different types of artifacts may also be added to this phase.

B. 1970-71 to 1979-80

1. Ganwaria in district Basti (now in district Siddharth Nagar) excavated by K.M. Srivastava of the ASI revealed a considerable deposit of pre-NBPW / pre-Iron deposit (*IAR* 1972-73: 33, 1973-74: 27-28, 1974-75: 39-41, 1975-76: 47-50, 1976-77: 50-52). The chronology (*c.* 800-600 BC) suggested by the excavator (Srivastava 1986: 62; 1996: 56) for this deposit, however, seems to be a little conservative.

2. S.N. Chaturvedi *et al.* from the University of Gorakhpur resumed excavation at Sohagaura (*IAR* 1974-75: 46-47; Chaturvedi 1985: 101-108), which revealed a five-fold culture sequence going back to Neolithic period. The excavator surmised the antiquity of its earliest cultural phase in 3rd millennium BC.

3. In Bihar, pre-800 BC deposits were brought to light at Champa, district Bhagalpur by B.P. Sinha *et al.* (*IAR* 1974-75: 8-9, 1976-77: 11-12) and Chechar Kutubpur, district Vaishali by R.S. Bisht (*IAR* 1977-78: 17-18) and B.K. Sharma of the ASI (*IAR* 1988-89: 9).

4. Explorations in different areas of the middle Ganga plain and Vindhyan hills continued to add more and more pre-Iron Age sites to our knowledge (Bhatt 1969-70; Pal 1986). A notable development of this decade having far reaching implications in Indian archaeology was the initiation of the study of the archaeobotanical remains of this region by Choudhury *et al.* (1971; 1977) and Vishnu Mittre (1972, 1974, 1975, 1978).

5. Occurrence of Neolithic deposits, preceding the Chalcolithic phase at Chirand and Sohagaura provided altogether a new dimension to the pre-Iron Age cultural scenario of the middle Ganga plain. Handmade corded ceramics, coarse variety of black-and-red ware, cultivation of rice, lithic celts and bone tools were suggested as the characteristic features of this culture. Radiocarbon dates from Sohagaura and Chirand provided ground for dating. On the basis of these dates, the beginning of Chalcolithic phase could be placed in the early half of the 2nd millennium BC. Presence of iron was marked at some of the sites in the upper levels of the Chalcolithic deposits; however, such deposits have been termed as marginal Chalcolithic.

6. Available information at this point of time showed that the subsistence of the Chalcolithic people was based on agriculture, hunting-gathering and fishing. They used black-and-red, red, grey and black slipped potteries, some of which bear cord impressions and painted-incised-applied decorations. Important shapes in pottery included vase, bowl, channel spouted vessel, lipped pot, bowl/dish-on-stand and pedestal bowl. Their structures comprised huts made of wattle-and-daub having reed screens plastered with clay, mud walls, hearths and earthen bins. Stone celts and microliths, beads made of steatite, terracotta and semi-precious stones, bone artifacts such as arrowheads are other cultural components. Steatite beads were found comparable with the Harappan wafer shaped steatite beads. The information regarding the floral and faunal remains remained very limited.

C. 1980-81 to 1989-90

1. The study of the middle Ganga plain Chalcolithic culture got new impetus in the ninth decade of the twentieth century. In Uttar Pradesh the remains of this culture came to fore at Khairadih, district Ballia (*IAR* 1981-82: 67-70, 1982-83: 92-94, 1983-84: 86-87, 1985-86: 77-78, 1996-97: 112) and Narhan, district Gorakhpur (*IAR* 1984-85: 89-91, 1985-86: 81-82, 1986-87: 79; Singh, P.

1994b) during the excavations carried out respectively by K.K. Sinha & B.P. Singh, and P. Singh of the BHU.

2. The sites in Bihar, which revealed the presence of this phase during the excavations, include Taradih, district Gaya by A.K. Prasad *et al.*, Bihar State Archaeology (*IAR* 1981-82: 11-12, 1982-83: 16, 25, 1983-84: 12-13, 1984-85: 9-11, 1985-86: 7-9, 1986-87: 23-24, 1987-88: 9-11, 1997-98: 14-15), Manjhi, district Saran by T.N. Roy, BHU (*IAR* 1983-84: 15-16, 1984-85: 12-13), Maner, district Patna by B. Narayan *et al.* during 1984-85 and subsequently by other investigators (*IAR* 1984-85: 11-12, 1985-86: 11-12, 1986-87: 25-26, 1988-89: 7-8, 1989-90: 10-11, 1991-92: 6-7, 1992-93: 6, 1993-94: 10-11, 1995-96: 5, 1997-98: 15-17) and Senuwar, district Rohtas (by B.P. Singh, BHU) (*IAR* 1986-87: 26-28; Singh 2004).

3. To understand the extent and other features of the contemporary sites, explorations at new as well as earlier reported sites in the Saryupar, Saryu-Ganga and Ganga-Vindhya plains were also carried out during this decade (Singh, B.P. 1990, 2004; Singh & Kumar 1994; Singh, *et al.* 1991, 1992, 1995; *IAR* respective issues).

4. Considering the presence of painted black-and-red ware in high proportion in the Chalcolithic deposits at Narhan, P. Singh (1994b) distinguished this culture as 'Narhan Culture'. It is to be understood that the black-and-red ware (both plain and painted) have been found at many other sites, including Sohagaura and Chirand, in different proportions. Other cultural components of such sites are almost common. Therefore, it seems reasonable to take the designation of 'Narhan Culture' as a variation within a broad term of Chalcolithic culture of the middle Ganga plain.

5. K.S. Saraswat and his younger colleagues Sharma, Pokharia and others followed Choudhary and Mittre. They made very significant contributions to the study of floral remains recovered at some of the Ganga valley sites during the excavations (Saraswat 1980, 1989, 1986; Sharma, A. 1983; Sharma, N.K. 1989; Kajale 1988; Kajale & Lal 1988; *IAR* 1983-84: 178, 1985-86: 123-125, 1986-87: 129-131, 1987-88: 151-153, 1989-90: 133).

D. 1990-91 to 1999-00

1. The excavations at Dhuriapar (*IAR* 1990-91: 71-72; Singh, P. 1992) and Imlidih Khurd (*IAR* 1991-92: 108-09, 1992-93: 92-93, 1995-96: 97-98; Singh, P. 1993, 1994a) in district Gorakhpur, by P. Singh added new evidence for understanding the pre-Iron Age cultures of the Saryupar region. Earthen silos, terracotta *chaukis*, a copper celt and Ganeshwar type copper arrowhead and a hoard of steatite beads from Imlidih Khurd deserve special mention here. Particularly the presence of steatite beads comparable to Harappan ones in grate numbers generated significant discussion about their context and related implications (Pant 1996).

2. In the Ghaghra-Ganga plain, Waina (*IAR* 1994-95: 72-73; Singh and Singh 1996) and

Bhuna Dih (*IAR* 1995-96: 82; Singh and Singh 1998), district Ballia and Agiabir (*IAR* 1998-99: 193-197, 1999-2000: 183-186), district Mirzapur, excavated by P. Singh *et al.* in order to understand the personality of 'Narhan Culture', also revealed considerable deposits of pre-Iron phases.

3. Excavations at Jhusi, district Allahabad, by Misra *et al.* (*IAR* 1994-95: 69-71, 1997-98: 164-170, 1998-99: 161-167; Misra *et al.* 1996, 1999, 2000, 2003; Pal 2008), provided another significant dimension to the pre-800 BC cultures of the middle Ganga plain. Out of 4.36 m thick pre-NBPW deposit unearthed at this site, 1.90 m thick deposit constituted pre-Iron horizon. Bowls, dishes, storage jars, pedestal bowls were the main shapes. Handmade pottery was also present. Bone arrowheads (barbed and socketed) with engraved circlets, were supposed to be characteristic type of the chalcolithic sites of the middle Ganga valley. Beads of semi-precious stones and terracotta, faunal and floral remains, microliths, post-holes, floors and hearths, burnt clay lumps with reed or split bamboo impressions are the main cultural remains.

4. Pre-NBPW deposits were also unearthed during the excavations carried out under the ASI by B.R. Mani *et al.* at Siswania (*IAR* 1995-96: 83-86, 1996-97: 118-126; Mani 2004), district Basti and by L.C. Singh *et al.* at Sravasti (*IAR* 1996-97: 171-176, 1997-98: 186-197, 1998-99: 207-213, 2000-01: 140-152, 2001-02: 260-283), district Sravasti in Saryupar.

5. C.P. Sinha *et al.* of the K.P. Jayaswal Institute, Patna undertook archaeological excavations at Ramchaura, Hajipur, district Vaishali and brought to light pre-NBPW deposit at another site of Bihar (*IAR* 1995-96: 6; 1997-98: 17-18). In Uttar Pradesh Aktha, district Varanasi yielded pre-NBPW deposit comprising iron artifacts from the lowest strata (Jayaswal 2002).

6. A systematic study of floral and faunal remains had been taken up for most of these sites. Published preliminary reports of Malhar and Imlidih Khurd by K.S. Saraswat (1992, 1993a, 1993b, 1994-95, 1995-96, 1996-97, 1997-98; Saraswat *et al.* 1994) furnished significant information. K.S. Saraswat's report on the systematically collected floral remains of Narhan (Saraswat *et al.* 1994) is the most remarkable achievement of this period, which provided dependable source material for understanding the subsistence economy of those days. The presence of jack-fruit at this site indicated long distance contacts with south Indian regions. The study of faunal assemblages was also given due attention at these sites (Chattopadhyaya 1994; Joglekar 2004).

7. The cultural sequence at Jhusi is dated by radiocarbon determinations. An AMS date could also be determined for Khairadih potsherds. The most significant development of this time-span is the appearance of iron-artifacts in the deposits hitherto identified as Chalcolithic on the considerations of their cultural components.

8. The beginning of iron has been recorded in the deposits dated to *c.* 1100 BC at Jhusi. Since the antiquity of iron has been considered around 900-800 BC for a long time, this early date taken together with the dates of iron bearing deposits of *c.* 1400/1300 BC at Raja Nala-ka-Tila and *c.* 1800-1600 BC at Malhar (Tewari 2003) in the adjoining Vindhyas and upper Ganga plain surprised many scholars and opened a new chapter to focus in future investigations.

9. The research publications contributed by Gudrun Corvinus (1990, 1991, 1993, 1994, 1998) regarding her investigations in Nepali's Terai during this decade changed the prevailing perception that the Ganga plain was inhospitable for the human occupation during the Early Stone Age due to its marshy land and thick forests. Her following observations regarding the Early Palaeolithic finds in Nepal are notable:

"The hand axes from Gadari are made in the Indian hand axe tradition and there seems to be no doubt that the people who were responsible for the Dang hand axes must have come from the Indian Peninsula".

"The only early Palaeolithic site discovered in Nepal lies 170 km to the ESE in particularly interesting geological context. Here at Satpati, west of where the Narayani river emerges in the Ganga plain, hand axes were embedded in sediments of the Ganga alluvium, which at this point experienced tectonic movements during the last Himalayan phase of folding and uplift. The hand axes had been buried by about 200 m of alluvial silts, sandstones and gravels, and by colluvial gravels, before they became folded, uplifted and exposed by the tectonic movements at the Himalayan mountain front" (Corvinus 1994: 80).

Above observations clearly indicate that the hand axes were already embedded in alluvial deposit before the whole surface folded and uplifted due to the last major Himalayan tectonic movement occurred around 500 ka, meaning thereby that the uplifted area antedates this tectonic event and at that time it was a part of the Ganga plain. Apart from that if we accept that the manufacturers of these artifacts would have come from the Peninsular India or even from Vindhyan hills there is only one reasonable route and that is through the Ganga plain. The implications of these finds could be hardly understood in reference to Ganga plain till I.B. Singh (2004a; 2004b) underlined them in his recent publications. It is quite probable that the palaeolithic people were traversing this region from very early times. However, we do not get their tell tale evidences, artifacts and other evidence because they might have been embedded deep under the thick alluvial deposits of the Ganga plain.

E. 2000-01 – onwards

1. At the end of twentieth century the type of human activity going on in this geo-unit before *c.* 2000 BC could not be fully understood. The investigations carried out at Lahuradewa (*IAR* 2001-02: 251-254), district Sant Kabir Nagar; Jhusi (*IAR* 2001-02: 236-238); and Hetapatti, district Allahabad have proved rewarding in this regard. A multi-disciplinary approach applied at Lahuradewa by a team comprising archaeologists from the Directorate of the U.P. State Archaeology and palaeo-botanists and geologists, etc. from the Birbal Sahni Institute of Palaeobotany (BSIP), University of Lucknow, Deccan College, Pune and other institutions revealed very significant evidence (Tewari *et al.* 2003, 2006, 2008; Saraswat & Pokharia 2004; Saraswat 2005; Chauhan *et al.* 2004a; 2004b; Chauhan 2005). Remaining two sites are investigated by a team of

the University of Allahabad under the leadership of V.D. Misra and J.N. Pal respectively (Misra *et al.* 2003; Pal 2008).

2.(1) Consistent presence of micro-charcoal in the lake-sediments from the lowest levels and evidence revealed at the archaeological site of Lahuradewa, dated by radiocarbon determination, showed that the human activities continued to take place in that area from about 10000-11000 years before present. Climatic conditions have been suggested on the basis of pollen profile, cultural pollen, phytoliths and diatom represented in respective lake sediments. The archaeological deposits of Lahuradewa have been classified in five cultural periods. Earlier three of them are relevant in the present context. These periods are designated as - Period I: Early Farming Culture, Period II: Developed Farming Culture, Period III: Advanced Farming Culture. Period I is further divisible into two sub-periods IA and IB. The available evidence indicates that the subsistence of the human inhabitants of this region was based on exploitation of wild flora and hunting in the beginning of sub-period IA. An AMS date of a husk piece of domesticated rice (*Oryza sativa*) shows that rice was being grown in 7th millennium BC at this site. According to Saraswat, other than domesticated rice, floral remains also include wild and weedy rice (*Oryza* cf. *rufipogon*), foxtail-millet (*Setaria* cf. *glauca*), goose-foot/bathua (*Chenopodium album*), job's tear (*Coix lachrymal-jobi*), Artemis (*Artemisia* sp.), flat sedge (*Cyperus* sp.) and catchfly (*Silene conoidea*) included in the assemblage recovered from Period IA. Faunal remains identified by Joglekar include a good proportion of fish bones some of which bear burning marks. Tortoise is represented by its broken shell-pieces. Dwellings of this sub-period were based on wooden post-holes and probably that ched with grass and straw like material. Walls were erected with clay plastered screens made of reed or similar material. Other structures include hearths and a channel. Appearance of new cultural components such as steatite and faience beads is marked towards the end of 4th and beginning of 3rd millennium BC. Barley, capra, dish-on-stand and copper arrowhead follow in the preceding layers. Subsequently wheat, pulses and other crops also appear. The quality of ceramics improves in general. Some of the black-and-red ware potsherds bear paintings. Other decorations comprise applied and incised designs. Apart from vase and bowls continuing from earlier sub-period, pedestal bowl, spouted, lipped vessel, perforated and footed pot are the other important shapes of this sub-period. Stone artifacts (a stone piece from the lower levels and a scraper from the upper horizon), a few bone tools and beads are also worthy of mention. A marked expansion in area of occupation is another significant development of this sub-period.

(2) Appearance of painted black slipped ware, earthen bins, terracotta tables (*chaukis*) and terracotta tiles towards the beginning of Period II (*c.* 2000 BC) marks a new trend. However, the last two components do not continue for a longer time. The ceramic assemblage and other cultural material of the earlier sub-period continued. Copper artifacts are represented in a small proportion. The presence of terracotta *chaukis*, earthen bins and steatite beads has also been observed in the

contemporary deposits at Imlidih Khurd, Dhuriapar, Chechar Kutubpur and other sites of the middle Ganga plain. The number of earthen bins at Lahuradewa apparently suggests considerable growth in agricultural production. The concentration of such bins in one area and post-holes found along with them provide ground to identify the whole complex as a granary. It appears that during this period the settlement of Lahuradewa expanded to its maximum and covered the whole of the available warped area at this site.

(3) Lahuradewa Period III (*c.* 1200 BC - 800 BC) is characterized with the appearance of iron artifacts. Dishes in red, black slipped and grey ware are the new shapes in pottery. A good proportion of button based lids also appear. Other cultural features remain almost the same as in Period II. It may be recalled here that the presence of iron was also marked in this phase at Narhan, Rajghat, Jhusi, Aktha and other sites too. However, considering their meagre proportion related deposits have often been placed in Chalcolithic or Marginal Chalcolithic phase. It appears that the iron being smelted in the north Vindhyan flanks from the early half of the second millennium BC would have been supplied to the Ganga plain settlements. An apparent growth in agricultural production is observed in this period.

3. Detailed reports on the floral remains of Senuwar and Malhar by K.S. Saraswat (2004a, 2004b, 2005) have provided very significant source material for understanding the food economy and flora of the successive periods and contacts with distant areas and cultures as well. According to Saraswat (2004a: 501) collective evidence of field crops shows that agriculture was based in rainy monsoon season on crops of indigenous and African origin, and during the winter on crops of west Asian origin and Indian mustard of north temperate zone. Obviously this double cropping helped in building up economic prosperity. The indigenous crops include rice (*Oryza sativa*), kodon-millet (*Paspalum scrobicu*latum), green-gram/*mung* (*Vigna radiate*), horse-gram/*kulthee* (*Dolichos biflorus*) and field-brassica (*Brassica juncea* (L.) *Czern & Coss*). West Asian and southern European cultigens include barley (*Hordeum vulgare*), dwarf wheat (*Triticum sphaerococcum*), bread wheat (*Triticum aestivum*), lentil (*Lens culinaris*), field-pea (*Pisum arvense*), chik-pea/gram (*Cicer arietinum*) and grass-pea (*Lathyrus sativus*). While *jowar* millet (*Sorgham bicolour*), ragi-millet (*Elausine coracana*), *til* (*Sesamum indicum* L.) and water melon (*Citrullus lanatus*) are the crops of African origin. The presence of iron wood at Senuwar indicated contacts with east Indian regions. Most importantly, for the first time, he suggested interaction between this region and Harappans on the basis of the appearance of barley, wheat and other crops during the subsequent period at this site.

4. According to Joglekar (2008), 'due to the faunal studies carried out in last few decades the evidence of animal based economy in the Ganga valley is growing. It begins with the Mesolithic and is available up to Early Historic period. The faunal remains studied in this regard belong to Senuwar, Malhar, Narhan, Khairadih, Lahuradewa and Jhusi in the middle Ganga plain and Damdama, Mahadaha, Sarai Nahar Rai, Tokwa and Raja Nala-ka-Tila in the adjoining area.

However, the evidence is not sufficient to trace the history of domestic animals such as the cattle, buffalo, sheep, goat, horse and the ass. The animal taxa identified at Ganga valley and Vindhyan sites include 8 domestic mammals, and several of non-mammals such as birds, reptiles, fish and molluscs. The cattle (*Bos indicus*) have been found at all the sites and in all the cultural phases. The domestic animals used as food resource include sheep and goat, buffalo and pig. The range of wild animals utilized is very diverse, which comprise bandicoot rat and common house rat, spotted deer, sambar, black buck and nilgai. During the Early to Advanced Farming stages the evidence for hunting large animals such as gaur has not been found except at Lahuradewa. The animals of medium size were hunted and used in the second millennium BC and early settlements. Subsequently, small animals were perhaps trapped and used. Interestingly, several carnivores being consumed includes wolf, jackal, fox, cheetah, panther or tiger and cat. The wild mammalian and non-mammalian species formed a marginal part of the animals used for food. It is to be noted that the so far available evidences show the appearance of domestic fauna in the Ganga plain in third millennium BC.

5. The outcome of the excavations at Jhusi and Hetapatti have provided more information and radiocarbon dates to largely support the conclusions derived from investigations at Lahuradewa, regarding the development of human cultures in the middle Ganga plain. Apart from that, these excavations show the use of a few microliths - a hallmark of the Mesolithic culture - in the subsequent cultures. The presence of such artifacts in Neolithic, Chalcolithic and NBPW phases is notable.

6. In Nepal's *tarai* pre-Iron Age deposits have come to fore during the excavations at Gotihwa by Verardi (2007: 17, 81) from the University of Naples, Italy. Radiocarbon dates for these deposits have placed the antiquity of this site to *c.* 12th century BC. This is the first site with consistent habitation deposit which has been dated to such an early date.

7. A rough estimate shows that at least 42 sites in the Ghaghara-Gandak interflue (Saryupar plain), 39 sites in the Ghaghara-Ganga Doab, 43 sites in the alluvial plain between Ganga and Vindhya-Hazaribagh plateau and 5 sites in the Gandak-Kosi-Mahananda plain associated with pre-NBPW (pre-800 BC) phase are so far known. This count indicates that at this point of time over one hundred and twenty five such sites are located in the middle Ganga plain. This calculation is mainly based on the consideration of the occurrence of certain shapes such as dish/bowl-on-stand, spouted vessel, lipped pot (*martban*), pedestal bowl, etc. The number of sites may go up, if we include all the sites reported as Chalcolithic in different reports. However, differentiation between the pre-NBPW/pre-Iron Age sites designated as marginal Chalcolithic on the basis of surface finds is very difficult because there is hardly any difference in the shapes and types of ceramics of this and those of NBPW/Iron Age periods. The most logical reason for a small proportion of known chalcolithic sites in north Bihar (Gandak-Kosi-Mahananda plain) may be the consistent devastating floods of the Kosi *maiya*, which erodes a large mass of land year-by-year and leaves no room for any primary deposition.

8. It may be noted here that presently our knowledge about the number of sites containing pre-2000 BC deposits in the middle Ganga plain is limited. Such sites dated with radiocarbon determinations include Lahuradewa, Khairadih, Jhusi, Senuwar, Chirand and Pana (personal communication from the excavator). On comparative considerations some more sites namely Sohagaura, Imlidih Khurd, Hetapatti and Taradih may also be placed in this category. It is to be noted here that during the course of exploration considering the surface finds most of these sites were identified as Chalcolithic (not earlier than *c.* 2000 BC). However, in excavations these sites yielded earlier cultural material. Therefore, it is apparent that many other sites might also be containing such ancient material embedded deep below the surface, which may come to fore in the future excavations. In any case present data demonstrates that the number of Developed Farming Culture sites is much higher than the Early Farming Culture sites. The number of Advanced Farming and subsequent settlements show further increase. This factor indicates gradual growth in demography of the human population in the middle Ganga plain and that the area was well occupied much before pre-800 BC.

F. Radiocarbon Dates

A good number of radiocarbon dates are now available for computing the chronology of the respective cultural phases from the beginning of agriculture onwards in the middle Ganga plain and adjoining Vindhyas. These dates are detailed below in two tables. First of them comprises the dates for pre-2000 BC deposits, while table 2 shows the subsequent dates for the pre-NBPW deposits.

Table 1

Dates Available for pre-2000 BC Deposits in Middle Ganga Plain

S. No.	*Name of Site and Material*	*Radiocarbon Dates*	*Reference(s)*
1.	Lahuradewa IA: Charcoal	PRL-3032: cal. BC 8813-9171 (8992)	Tewari, *et al.* 2008: 358
2.	Lahuradewa IA: Charcoal	PRL-3031: cal. BC 8340-8696 (8518)	Tewari, *et al.* 2008: 358
3.	Lahuradewa IA: Charcoal	PRL-3030: cal. BC 8317-8555 (8436)	Tewari, *et al.* 2008: 358
4.	Lahuradewa IA: Rice husk	ERL-6442: cal. BC 6442-6442–6376 (AMS)	Tewari, *et al.* 2006: 49
5.	Lahuradewa IA: Charcoal	BS-1967: cal. BC 5298	Tewari, *et al.* 2006: 49
6.	Lahuradewa IA: Charcoal	BS-1951: cal. BC 4220, 4196, 4161	Tewari, *et al.* 2006: 49
7.	Lahuradewa IA: Charcoal	BS-2145: cal. BC 3090 (2916) 2879	Tewari, *et al.* 2006: 49

contd.

S. No.	*Name of Site and Material*	*Radiocarbon Dates*	*Reference(s)*
8.	Lahuradewa IA: Charcoal	BS-2148: cal. BC 3363 (3328, 3323, 3174, 3159, 3119, 3106, 3105) 3020	Tewari, *et al.* 2006: 49
9.	Lahuradewa IA: Charcoal	BS-2151: cal. BC 3654 (3635, 3553, 3542) 3382	Tewari, *et al.* 2006: 49
10.	Lahuradewa IB: Charcoal	BS-1950: cal. BC 2135 (2078) 2056	Tewari, *et al.* 2006: 49
11.	Lahuradewa IB: Charcoal	BS-2274: cal. BC 2919 (2700) 2570;	Tewari, *et al.* 2006: 49
12.	Lahuradewa IB: Barley grain	ERL-6903: cal. BC 2345 (2273) 2200 (AMS)	Tewari, *et al.* 2006: 49
13.	Jhusi: Charcoal	BS-2526: cal. BC 7477	Pal. 2008. *nd.*
14.	Jhusi: Charcoal	BS-2525: cal. BC 6196	Pal. 2008. *nd.*
15.	Jhusi: Charcoal	BS-2524: cal. BC 5837	Pal. 2008. *nd.*
16.	Tokwa: Charcoal	BS-2417: cal. BC 6591	Pal. 2008. *nd.*
17.	Tokwa: Charcoal	BS-2369: cal. BC 5976	Pal. 2008. *nd.*
18.	Tokwa: Charcoal	BS-2464: cal. BC 4797	Pal. 2008. *nd.*
19.	Koldihwa: Charcoal	PRL-101: cal. BC 5410-5010	Posshel & Rissman 1992: 461
20.	Koldihwa: Charcoal	PRL-100: cal. BC 6375-5645	Posshel & Rissman 1992: 461
21.	Kunjhun: Charcoal	BETA-6414 cal. BC 2675-2515	Posshel & Rissman 1992: 461
22.	Kunjhun: Charcoal	BETA-6415 cal. BC 3530-3335	Posshel & Rissman 1992: 461
23.	Malhar	BS-1590 cal. BC 2283 (2141) 1984	Tewari, *et al.* 2004: 29
24.	Malhar	BS-1593 cal. BC 2012 (1882, 1836, 1834) 1742	Tewari, *et al.* 2004: 29
25.	Malhar	BS-1614 cal. BC 5329, 5323, 5262	Tewari, *et al.* 2004: 29
26.	Khairadih: Plant remain	AMS-724 cal. BC 2853 (2559, 2544, 2495) 2404	Bellwood, *et al.* 1992: 163

Table 2

Dates Available for the pre-NBPW Deposits in Middle Ganga Plain

S. No.	*Name of Site and Material*	*Radiocarbon Dates*	*Reference(s)*
1.	Lahuradewa II	BS-2150 cal. BC 2012 (1884) 1750	Tewari, *et al*. 2003
2.	Lahuradewa II	BS-1938 cal. BC 1519 (1435) 1399	Tewari, *et al*. 2003
3.	Lahuradewa III	BS-1939 cal. BC 1205 (1205) 1188	Tewari, *et al*. 2003
4.	Imlidih Khurd	TL Date: 1600 BC	Singh, P. 1996: 7
5.	Jhusi	PRL-2077 cal. BC 1107 (973, 956, 941) 844	Misra, *et al*. 2000: 28
6.	Jhusi	PRL-2082 cal. BC 966 (830) 799	Misra, *et al*. 2000: 28
7.	Jhusi	PRL 2083 cal. BC 1797 (1490, 1480, 1450) 1400	Misra, *et al*. 2000: 28
8.	Malhar	BS-1593 cal. BC 2012 (1882, 1836, 1834) 1742	Tewari, *et al*. 2004: 29
9.	Chirand: Charcoal	TF- 1032 cal. BC 2195-1750	Posshel & Rissman 1992: 463
10.	Chirand: Charcoal	TF- 1031 cal. BC 2145-1690	Posshel & Rissman 1992: 463
11.	Chirand: Charcoal	TF- 1034 cal. BC 1900-1660	Posshel & Rissman 1992: 463
12.	Chirand: Charcoal	TF- 1033 cal. BC 1880-1595	Posshel & Rissman 1992: 463
13.	Chirand: Charcoal	TF- 1127 cal. BC 1685-1400	Posshel & Rissman 1992: 463
14.	Chirand: Charcoal	TF- 1032 cal. BC 2195-1750	Posshel & Rissman 1992: 463
15.	Chirand: Charcoal	TF- 1028 cal. BC 1880-1595	Posshel & Rissman 1992: 463
16.	Chirand: Charcoal	TF- 445 cal. BC 1990-1695	Posshel & Rissman 1992: 463
17.	Chirand: Charcoal	TF- 1030 cal. BC 1910-1665	Posshel & Rissman 1992: 463
18.	Chirand: Charcoal	TF- 1125 cal. BC 2195-1750	Posshel & Rissman 1992: 463
19.	Senuwar: Charcoal	BS-908 cal. BC 2363 (2190) 2030	Singh 2004: 27
20.	Senuwar: Charcoal	BS-911 cal. BC 1908 (1725) 1567	Singh 2004: 27
21.	Senuwar: Charcoal	BS-755 cal. BC 2125 (1958) 1798	Singh 2004: 27
22.	Senuwar: Charcoal	BS-757 cal. BC 1760 (1617) 1497	Singh 2004: 27
23.	Gotihwa: Charcoal	Beta 178562 cal. BC 1210-1100	Verardi 2007: 81

Discussion and Conclusions

1. The Hunter-gatherers

1.1 The evidence of Palaeolithic artifacts revealed from Nepalese Tarai (Corvinus) taken together with the presence of Early Palaeolithic tools at Mau, district Banda (*IAR* 1968-69: 34), middle Palaeolithic stone artifacts at Bahadarabad, district Haridwar (Sharma 1985: 35) and bone and stone artifacts along with faunal fossil remains at Kalpi in the deposits datable to 43000 yr BP (Tewari *et al.* 2002: 1-14; *IAR* 2002-2003: in press) also indicate human activity in different areas of the Ganga plain. These artifacts have been found from the tectonically uplifted Siwalik regions in the deposits opened due to erosion and open river sections in the marginal areas of the Ganga plain. In other areas of this vast plain too, we may expect such evidence, wherever left by the ancient humans, embedded below a very thick deposit of alluvium, thus beyond our normal reach.

1.2 The study of Lahuradewa lake-sediments and archaeological deposits attests human activity going on in the area from about 11,000 yr. It is worth mentioning here that Sharma on the basis of the presence of supposedly some Epi-Palaeolithic and Mesolithic sites, numbering over 200, in the districts of Allahabad, Jaunpur, Varanasi and Pratapgarh had surmised the beginning of human activity in terminal Pleistocene/ early Holocene in the Ganga plain around 19000 yr onwards (Sharma 1975: 13-15; Sharma *et al.* 1980: 121). Palynological studies on the lake sediments of Sanai Tal, in district Rae Bareli have revealed the presence of cultural pollens and microscopic charcoal pieces throughout the lake depositional history of last 15 000 years, suggesting consistent anthropogenic activity in the region during this period (Sharma, *et al.* 2006; 2004). According to this study, the cultural pollens in these profiles show changes with the changing climate. They suggest that there is decrease in cultural pollens around 11,500-10,500 yr BP and increase in cultural pollen in last 5000 years indicating advanced anthropogenic activity.

2. *Farmers*

2.1 The evidence from Lahuradewa attests that the inhabitants of this region were growing paddy in *c.* 7th millennium BC and exploiting the other flora too. Hunting and fishing, evident by the faunal remains, were their other means of subsistence. Their dwellings were made of wattle-and-daub structures having clay plastered screens of reed like material. Their ceramic industry included black-and-red and red wares. In the beginning mostly they used hand made earthen vases and bowls. Cord impressions on a good proportion of pottery attest the knowledge of weaving. This way of life continued for a long duration of about 4000 yr. However, due to the limitation of only about half a meter archaeological deposit we are not in a position to understand the gradual growth of this early farming culture. The evidence from Koldihwa, Tokwa, Kunjhun and Malhar in the adjoining Vindhyas and Jhusi in the middle Ganga plain, dated by radiocarbon determinations (between *c.* 7th-4th millennium BC) also subscribe the early beginning of paddy cultivation and domestication in the middle Ganga plain and adjoining region. The occurrence of corded ware at some of the Vindhyan Mesolithic sites and appearance of domesticated barley and rice at Damdama in a Mesolithic context indicate symbiotic relationship between the early farmers and hunter-gatherers. Apparently both the cultures were surviving side-by-side in the Ganga plain from at least *c.* 7th millennium BC onwards. The use of Microliths at Jhusi even after the beginning of farming shows the continuity of this component from the hunter-gatherer stage to the subsequent cultures. Continuity of earlier traditions is also seen in the usage of heavy duty tools such as *sil* and *lodha* and hunting-gathering-fishing practices.

2.2 Appearance of domesticated barley and goat (*capra*) along with copper arrowhead (Ganeshwar type), steatite beads, dish-on-stand and a few painted potsherds in early half of the third millennium BC onwards mark the next stage of the early farming cultures of the middle Ganga plain. Wheat and pulses also join gradually. Lahuradewa, Sohagaura, Imlidih Khurd, Khairadih and Jhusi are the sites to show this phenomenon. The cultural assemblage includes lithic artifacts in smaller proportion at the middle Ganga plain sites. Such artifacts form a good proportion at the sites located in the areas nearer to Vindhyas. Ceramic industries, architectural tradition and subsistence pattern of the earlier phase continues. Apart from cording, during this phase, some of the vessels were being decorated with painted, incised and applied patterns too. Spouted vessels, perforated and footed bowls are the other important shapes to be noted in this phase. The use of bone arrowhead is also remarkable. The extent of sites considerably expands in this period. Evidence of wooden structures is evident by the presence of postholes, etc., however, how grand or average these structures would really have been, is a question that remains to be solved.

2.3 Around 2000 BC new cultural trends appear in this region. These are represented by earthen bins in a considerable number, terracotta *chaukis* (small footed stool like objects) and tiles, enhanced agricultural production, and further expansion in settlement area. Painted black slipped ware is the diagnostic pottery of this period and remains so for at least 1000 years. However, it may be noted here that at certain sites such as Jhusi this component is almost absent in the contemporary deposits. Construction of earthen bins, some times as at Lahuradewa in clusters, show that need of storage was enhanced to a considerable level by this time. One such cluster at this site seems to represent a granary.

2.4 The cultivated cereals include rice, barley, three types of wheat, field pea, chick pea, green gram, lentil, kodon millet. Cultivated oil seeds comprise mustard, linseed, sesame, safflower, castor, etc. While jackfruit, mango, grape, date, nux vomica and *tulsi* are important amongst fruits and herbs. Charred, semicharred, uncharred animal bones of humped cattle, buffalo, sheep, goat, dog, pig, deer, antelope, etc. along with faunal remains of fish, turtle and birds show that their meat must have formed an important part of subsistence.

2.5 Some of the sherds of the associated black-and-red and red wares were also being decorated with painted designs. Grey ware is another pottery of this phase. The paintings are executed in white, black and occasionally red pigments. The painted patterns comprise wavy lines, straight and oblique strokes, dots, lattice, concentric arcs, semi-circles, vertical and horizontal lines. Incised decorations include rows of dots and strokes, linear patterns, zig-zag, wavy lines, criss-cross designs, lattice diamonds, etc. applied designs comprise mainly rope pattern. Knobbed and cut designs besides post firing scratched patterns are also found.

2.6 The shapes in pottery comprise different types of bowls such as shallow to deep, convex sided, carinated, shouldered, etc.; convex sided basin, lipped vessels, spouted pots, beakers, footed and perforated vessels, dish-on-stand, bowl-on-stand, *lota* shaped vessels, and so on. Other cultural traits of the earlier period continued in this phase also. However, the *chaukis* and tiles disappear shortly. Except at Senuwar, copper artifacts are represented in small proportion. Beautiful arrowheads and other tools including awls, points, fish-hooks, chisels, stylus, pins and beads fashioned on bone and horns are represented in considerably high numbers. Beads, pendants, bangles, rings, etc. made of semi-precious stones, steatite, faience, bone, shell, terracotta and copper provide a glimpse of ornamentation prevailing in the concerned societies. The microliths and a few stone celts have been reported from the sites nearer to the Vindhyan flanks. Pottery discs, balls, dabbers, animal figurines form the other associated cultural assemblage.

2.7 Most of the sites show continuation of the above cultural features with the addition of certain new shapes in pottery such as convex sided dishes and corrugated bowls in the subsequent period between *c.* 1500 and *c.* 800 BC. Iron appears at some of the sites in the terminal phase datable around 900 BC. However, at some other sites this metal has been found in the deposits dated to *c.* 11th century BC (Jhusi) and *c.* 12th century BC (Lahuradewa). The size of settlements and agricultural production shows further increase. Other cultural traits of the earlier phases show continuity. More or less the subsistence pattern remained the same.

2.8 Saraswat (2001) has pointed out the possible use of lichen (*Everniastrum cirrhatum*) found at Imlidih in the deposit placed between 1300-800 BC, as an ingredient of spices and medicine. It is locally known as Chharaila and occurs in the Himalayas at elevation of 1000-4000 m. The occurrence of Putranjeeva (*Drypetes roxburghi*) nuts, a few with holes, from the same site has been underlined by him. He has highlighted this find in view of social belief that the children wearing their necklace remain safe from any harm. The occurrence of jackfruit at Narhan and iron wood at Senuwar identified by Saraswat, indicate contacts between Ganga plain and eastern, central and southern India in the later half of the second millennium BC.

2.9 The selection of settlement sites in a naturally secured setting is marked at many sites discussed above. For example, the site of Jhusi is almost surrounded by a loop like turn of two rivers, while Lahuradewa is secured from all sides by the water bodies. Invariably the most warped areas, beyond the reach of flood water have been preferred for settlement. Full pattern of settlement is not known due to want of large area of excavations at any of the concerned sites. The archaeological material available from these sites does not reflect much on social and political order. The presence of spouted vessels in grater proportion at certain sites and their meagre or lesser representation at the other sites may be indicative of some prevailing ritual practices among certain settlers. This particular vessel reminds us the modern day *karwa puja* (worship) in which such pots are still being used.

2.10 As far as use of metal for advanced agriculture is concerned, Saraswat's observations regarding the plant economy of Senuwar may aptly be applied on this entire area under discussion. According to him (Saraswat 2004a: 507-8), Rich data on the crop remains amply demonstrate that despite the metal technology Neolithic farmers could successfully exploit the land resources for sufficient means of advanced agriculture. Mainly they were having wet-field cultivations system and grew rice in swampy or inundated habitats. Only by creation of artificial habitats, it would have been possible for them to raise the crops of various types, just on the same pattern followed by contemporaneous or later Chalcolithic communities. It is regarded that the metal technology was by far the most important factor which heralded a new change in the cultural advancement, and accelerated the forest clearance to obtain tracts for settlement and agriculture. But the factual evidence of varied types of crop remains from Senuwar and other Neolithic sites as well does not support this issue, as far as agriculture is concerned. Farming was successfully operated prior to the introduction of metal technology. Metal technology seems to have provided, indeed, an additional techno-environmental efficiency. Certain technological innovations even in the Neolithic times made it possible to transfer the cultivation systems of highly advanced Harappan and other Chalcolithic cultures to diverse environmental zones.

3. Terminology

The terminology generally applied for the pre-Iron Age human cultures are Palaeolithic (sub-divided into lower to upper Palaeolithic), Mesolithic, Neolithic and Chalcolithic cultures. These cultures are further sub-divided on the basis of tool manufacturing techniques and other considerations. It is notable here that people practiced hunter-gatherer way of life from Palaeolithic to Mesolithic period. Mesolithic represents the transition from hunter-gatherer way of life towards the sedentary food producing stage well known as Neolithic. The use of microliths and hunting gathering are the main traits of Mesolithic. The Neolithic stage is characterized by the use of certain stone tools such as polished stone celts, adzes, etc. The use of copper and lithic artifacts is considered as the main components of Chalcolithic and use of iron for Early Iron cultures.

Regarding the Ganga plain in general and middle Ganga plain in particular, a few indicative evidences are available for the Palaeolithic period. Mesolithic way of life continued even after the beginning of agriculture at different sites. Therefore, the appellation of Hunter-Gatherer for the Stone Age cultures covering Early to Mesolithic phases would be more logical and simple.

In view of available evidence from the middle Ganga plain, the cultural phases popularly designated as Neolithic, Chalcolithic and Iron Age, also need revision. Considering the core element of agriculture and related aspects and marginal impact of stone, copper and iron during the respective cultural stages designated as above, we have proposed the following terminology for them - *Early Farming Culture, Developed Farming Culture* and *Advanced Farming Culture.* Agriculture has been the main subsistence for the middle Ganga plain settlers from *c.* 7th millennium BC to *c.* 800 BC. Though the copper and iron appeared in *c.* 3rd and 2nd millennium BC respectively, the subsistence pattern remained more or less the same. Even after the subsequent evolution of early historical cities and further developments this pattern did not change much. Agriculture remains the core of Ganga Plain cultures and even today it is the most characteristic feature. This region is rightly designated as *krishi pradhan* (agriculture based). The personality of the Middle Ganga Plain culture may be termed as 'Farmer's Culture'.

4. *Long Distance Contacts During Developed Farming Phases*

The general perception regarding the greater part of the Ganga plain has been that it was not occupied during the 3rd millennium BC (Harappan period) and the limited population living in certain pockets was enjoying the hunter gatherer's way of life. The recent evidence from Chirand, Sohagaura, Senuwar, Khairadih, Imlidih Khurd, Jhusi, Hetapatti, Damdama and Lahuradewa has provided enough ground to review this perspective.

The presence of domesticated grains of barley, domesticated goat, dish-on-stand, copper arrowhead (Ganeshwar type), fishing hook, steatite beads and goat (*capra*) in the early half of the 3rd millennium BC and subsequent inclusion of west Asian and southern European cultigens and dwarf wheat (*Triticum sphaerococcum*), bread wheat (*Triticum aestivum*), lentil (*Lens culuinaris*), field-pea (*Pisum arvense*), chick-pea/gram (*Cicer arietinum*), grass-pea (*Lathyrus sativus*), and crops of African origin *Jowar* millet (*Sorgham bicolour*), *ragi*-millet (*Elausine coracana*), *til* (*Sesamum indicum L.*) and water-melon (*Circullus lanatus*) during the later half of the third millennium and a little later show that the spread of food grains from north-western India to Gangetic plain and vice-versa occurred during 3rd and 2nd millennium BC due to direct or indirect interaction between these regions (Saraswat, 2004a: 487-508, 2004b: 157-169, Saraswat & Pokharia, 2003, 2004: 46). On the other hand domesticated rice, coarse variety of black-and-red ware and corded pottery found at many sites in early to late Harappan context, indicates some contact between the middle Ganga plain and the western part of the Indian sub-continent.

The presence of black basalt celts and other lithic materials from the Vindhyan source at Lahuradewa and Narhan from the lower levels of the Chalcolithic period as also the similarities in pottery attests their interaction with that area. Similarly the beads of semi-precious stones also indicate their direct or indirect long distance contacts.

The occurrence of iron-wood/Nag-Kesar (*Mesua ferrea*) from Neolithic/Chalcolithic period (*circa* 1950-1300 BC) at Senuwar, an element of evergreen forests in Assam and Bengal shows that the people in middle Ganga plain were interacting with the far-flung eastern regions and exploited this valuable raw material (Saraswat 2004a: 519-21). The utilization of the quality timber of 'Deodar' (*Cedrus deodara*) from Himalaya during Chalcolithic times around 1000 BC is also to be reckoned with (Saraswat 2004a: 521). The above mentioned occurrence of 'Chharaila' another product from Himalayas and jackfruit a fruit from western ghat also indicate long distance interaction.

5. *Pauranic Genealogy*

A remarkable change in the prevailing perception is regarding the Pauranic genealogy. Considering these genealogies of the ancient kings described in the Pauranic and other ancient literature and date of Buddha, Manu the first king of Ikshavaku dynasty of Solar Race of Ayodhya is placed roughly between 2800 and 3500 BC. The tradition and these sources also associate Pratisthan (Jhusi on the confluence of the Ganga and the Yamuna) with the Lunar dynasty and that it was founded by Ila, daughter of Manu who was married to son of Som (*chandra*: moon). Kashi, Kausambi, Mathura and Hastinapur are also considered to be contemporary settlements. On the other hand, most of the archaeologists and historians do not consider the above mentioned literature as reliable source, because the antiquity of the earliest occupational deposits of most of the archaeologically excavated sites, *i.e.*, Varanasi (Rajghat), Ayodhya, Sravasti, Mathura, etc. has been suggested around 800-700 BC. Now, in the light of new evidence attesting the presence of a considerably large number of sites of pre-800 BC phase in the middle Ganga plain this aspect needs a fresh review. In wake of Jhusi excavation, Misra *et al.* (2001b: 307-8) have aptly observed in this regard:

> "As per tradition it is associated with the rulers of the Lunar dynasty. Though a lot of myth is associated with the dynasty and its rulers, it is unlikely that the traditional narratives as enshrined in the Epics and the *Puranas* would have been a figment of imagination. As previously the antiquity of various sites in the Ganga valley was not supposed to be earlier than 6th century BC, a time which witnessed sixteen *Mahajanapadas* and a time which had the privilege of listening to the gospels of Vardhaman Mahavira and Gautam Buddha. But now as the antiquity of not only Jhusi but a few other sites of the Ganga valley are being traced to mid of second millennium BC the epics and the Pauranic records about the rulers and the dynasties associated with these places might have contained historical facts. Even though we are not in a position to say anything about the historicity of this or that ruler antedating the Buddha at the site going back to mid of the second millennium BC. It may be visualized the people who had occupied the site before the emergence of sixteen *Mahajanapadas* might have played some role in the political history of the times."

6. *Prelude to Urbanism*

The available facts show continuity in human cultural traits right from the beginning of the Holocene in the middle Ganga plain. Farming-gathering-hunting economy, settlement pattern, architecture, ceramic tradition, manufacturing of bone tools, etc. remain characteristic features of the pre-NBPW cultures of this geo-unit. Considering these factors Misra (2006: 30) has observed:

> "The emergence of the second urbanization should not be looked as sudden out burst of economic activities side by side with new political awareness. Ground was already prepared for the same. New social and economic order had already been established. Parts of old religious ideas were looked askance. New challenges were being thrown up. The religious upheavals of 6th century BC, particularly the teachings of Buddha and Mahavira, should be seen as response to the existing realities."

7. *Large Scale Occupation and Dense Forests*

It has been popularly believed that dense forests were existing to the east of the Yamuna, which could be cleared by the Aryans with iron artifacts for large scale settlements around 700-800 BC. This Aryan expansion from Srasvati in the west to the Sadanira in the east is often associated with the well-known Videgh Mathava episode of the Satapatha Brahmana. The presence of so many pre-800 BC / pre-Iron Age human settlement sites, related to early farming communities in the middle Ganga plain, attest that the long held perception of dense forests preventing the large scale occupation and agriculture is not tenable in the light of new evidence. This aspect has been discussed elsewhere in detail by the author (Tewari 2004).

8. *Ganga Plain People*

No human skeleton could be found at any of the excavated sites in the middle Ganga plain so far, which deprives us to understand their salient features. However, a good number of human burials have been unearthed in the nearby eastern upper Ganga plain sites in district Pratapgarh at Sarai Nahar Rai, Mahadaha and Damdama provide very significant information about the Ganga plain people occupying that area. According to Kennedy and other experts (1992; 1980) who have studied these skeletal remains recovered from these burials these people were tall, well built and different from their contemporary inhabitants of Vindhyan and Peninsular India. Thus, the Ganga plain people were having their own personality.

Acknowledgement

The author is grateful to Professor Vibha Tripathi for inviting him in the Seminar on Studies on the 'Ganges Civilization: The Shifting Paradigm', organized by the Department of AIHC & Archaeology, BHU, Varanasi held in February 2006. Thereafter, despite my best efforts to prepare

this paper for publication, and Professor Tripathi and Dr. Prabhakar Upadhyay's consistent reminders, probably, I would not have achieved this task if I was not permitted to go to Cambridge regarding the UKIERI project, for which I am indebted to Sri Awanish Kumar Awasthi, Secretary, Culture, Government of Uttar Pradesh. Principal Investigators of the UKIERI project – Dr. R.N. Singh, BHU and Dr. Cameron A. Petrie, University of Cambridge – arranged and coordinated for the facilities to work on project related themes in Cambridge during which I could spare some time to complete this paper. I extend my sincere thanks to both of them and especially to the Director and Deputy Director of the McDonalad Institute for inviting me as a Visiting Scholar. During my stay at Cambridge, I have benefited by interactions with Professor Dilip K. Chakrabarti's suggestions for which I extend respectful thanks to him. This paper contains inputs from a number of scholars and colleagues working and synthesizing the status of archaeology of the Ganga plain from a long time, I take this opportunity to record my sincere thanks and regards to them.

BIBLIOGRAPHY

Bhatt, S.K. 1969-70. Archaeological Exploration in Basti District. *Puratattva* 3: 77-88.

Bellwood, P., R. Gillespie, G.B. Thompson, J.S. Vogel, I.W. Ardika and Ipai Datan 1992. New Dates from Prehistoric Asian Rice. *Asian Perspective* 31: 161-170.

Chakrabarti, D.K. 1999. *India: An Archaeological History*. Delhi: Oxford University Press.

Chakrabarti, D.K. 2001. *Archaeological Geography of the Ganga Plain: The Lower and the Middle Ganga*. New Delhi: Permanent Black.

Chakrabarti, D.K. 2006. *The Oxford Companion to Indian Archaeology: The Archaeological Foundations of Ancient India*. New Delhi: Oxford University Press.

Chattopadhyaya, U.C. 1994. A Preliminary Report on the Faunal Remains from Narhan, Gorakhpur (U.P.). In *Excavations at Narhan (1984-89)*. P. Singh (ed.): 246-256. Delhi & Varanasi: Banaras Hindu University & B.R. Publishing Corporation.

Chaturvedi, S.N. 1985. Advance of Vindhyan Neolithic and Chalcolithic Cultures to the Himalayan Tarai: Excavation and Explorations in the Sarayupar Region of Uttar Pradesh. *Man and Environment* 9: 101-108.

Chauhan, M.S., A.K. Pokharia and I.B. Singh 2004a. Archaeology of Lahuradewa Area, Ganga Plain: Pollen Records of Holocene Vegetation and Climate Change from Lahuradewa Lake. In *Abstract: Joint Annual Conference (IAS, ISPQS, IHCS) and National Seminar on the Archaeology of the Ganga Plain (28-31 December 2004)*: 41. Lucknow: Directorate of U.P. State Archaeology.

Chauhan, M.S., A.K. Pokharia and I.B. Singh 2005. Preliminary Pollen Analytical Investigation of Early Holocene Sediments from Lahuradewa Lake District Basti (Sant Kabir Nagar), U.P. *Pragdhara* 15: 33-38.

Chauhan, M.S., C. Sharma, I.B. Singh and S. Sharma 2004b. Proxy Records of Late-Holocene Vegetation and Climate Changes from Basaha Jheel, Central Ganga. *Journal of Palaeontological Society of India* 49: 27-34.

Choudhury, K.A. 1971. Botany. In *A Concise History of Science in India*. D.M. Bose, S.N. Sen and B.V. Subbarayappa. New Delhi: Indian National Science Academy.

Choudhury, K.A., K.S. Saraswat and G.M. Buth 1977. *Ancient Agriculture and Forestry in North India*, New Delhi-Bombay-Calcutta: Asia Publication House.

Corvinus, G. 1990. A Note on the First Discovery of Handaxes in Nepal. *Man and Environment* 15 (2): 9-11.

Corvinus, G. 1991. A Handaxe Assemblage from Western Nepal. *Quartar* 41/42: 155-173.

Corvinus, G. 1993. The Surai and Rato Khola Fossiliferous Sequence in the Siwalik Group of Sediments in Nepal. *Himalayan Geology* 15: 49-61.

Corvinus, G. 1994. Prehistoric Occupation Sites in the Dang-Deokhuri Valleys of Western Nepal. *Man and Environment* 19: 73-89.

Corvinus, G. 1998. The Lower Palaeolithic Occupations in Nepal in Relation to South Asia. In *Early Human Behaviour in Global Context: The Rise and Diversity of the Lower Palaeolithic Record*. M.D. Petraglia and R. Korisettar (eds.): 391-417. London-New York: Routledge.

Indian Archaeology: A Review (*IAR*). New Delhi: Archaeological Survey of India.

Jayaswal, V. 2002. Aktha: A Satellite Settlement of Sarnath, Varanasi (Report of the Excavations conducted in 2002). *Bharati (Bulletin of the Dept. of AIHC and Archaeology, BHU)* 26: 61-80.

Joglekar, P.P. 2004. Faunal Remains from Malhar, District Chandauli, Uttar Pradesh. *Pragdhara* 14: 113-136.

Joglekar, P.P. 2008. A Fresh Appraisal of the Animal-based Subsistence and Domestic Animals in the Ganga Valley. *Pragdhara* 18: 309-321.

Kennedy, K.A.R., John R. Lukacs, Robert F. Pastor, Thomas L. Johnston, Nancy C. Lovell, J.N. Pal, Brian E. Hemphill and Christopher B. Burrow 1980. *Mesolithic Human Remains from Gangetic Plains, Sarai Nahar Rai*. Ithaca: Cornel University.

Kennedy, K.A.R., John R. Lukacs, Robert F. Pastor, Thomas L. Johnston, Nancy C. Lovell, J.N. Pal, Brian E. Hemphill and Christopher B. Burrow 1992. *Human Skeletal Remains from Mahadaha: A Gangetic Mesolithic Site, South Asia*. Occassional Papers and Theses No. 11. Ithaca: Cornel University.

Mani, B.R. 1998. Two Seasons of Archaeological Investigations in Trans Ghaghara Plains (District Basti and Siddhartha Nagar, U.P.) 1995-97. *Pragdhara* 8: 107-136.

Mani, B.R. 2004. Excavation at Siswania (District Basti, U.P.) 1995-1997. *Puratattva* 34: 100-115.

Misra, B.B. 2000. A Chalcolithic Culture of the Northern Vindhyas and the Mid Ganga Valley. In

Peeping Through the Past (Prof. G.R. Sharma Memorial Volume). V.D. Misra and J.N. Pal (eds.): 66-85. Allahabad: University of Allahabad.

Misra, V.D. 1970. Chalcolithic Cultures of Eastern India. *The Eastern Anthropologist* 23 (3): 243-259.

Misra, V.D. 2002. Origin, Chronology and Transformation of the Mesolithic Culture in India. In *Mesolithic India*. V.D. Misra, and J.N. Pal (eds.): 445-465. Allahabad: University of Allahabad.

Misra, V.D. 2006. Chalcolithic Cultures of North-Central Vindhyas. *Pragdhara* 16: 171-182.

Misra, V.D. and M.C. Gupta 1995. Pre-NBPW Cultures of the Mid-Ganga Valley. In *Agam Prasad Mathur Felicitation Volume*, No. 3. R.K. Verma *et al.* (eds.): 21-34. Agra: Hazuri Bhawan, Peepalmandi.

Misra, V.D. and M.C. Gupta 2006. Pre-NBP Cultures of the Middle Ganga Valley: Some Observations. *Pragdhara* 16: 21-34.

Misra, V.D. and Pragya Misra 2002. The Early History of Middle Ganga Plain: The NBP Ware Cuture, The Second Urbanization and Buddha. In *Udayana: New Horizons in History, Classics and Inter-Cultural Studies* (Essays in Honour of Prof. Udai Prakash Arora). A.K. Sinha and A.K. Singh (eds.): 348-356. New Delhi: Anamika Publishers and Distributors.

Misra, V.D., B.B. Misra, J.N. Pandey and J.N. Pal 1996. A Preliminary Report on the Excavations at Jhusi 1995. *Pragdhara* 6: 63-66.

Misra, V.D., J.N. Pal and M.C. Gupta 1999. Further Excavations at Jhusi, District Allahabad (Uttar Pradesh): 1998. *Pragdhara* 9: 43-49.

Misra, V.D., J.N. Pal and M.C. Gupta 2000. Further Excavations at Jhusi 1998-99. *Pragdhara* 10: 23-30.

Misra, V.D., J.N. Pal and M.C. Gupta 2001a. Excavation at Tokwa: A Neolithic-Chalcolithic Settlement. *Pragdhara* 11: 59-72.

Misra, V.D., J.N. Pal and M.C. Gupta 2001b. Excavations at Jhusi: Archaeological and Historical Implications. In *Contemporary Historiography Methodology and Trends*. S.R. Dubey (ed.): 301-315. Delhi: Pratibha Prakashan.

Misra, V.D., J.N. Pal and M.C. Gupta 2003. Further excavations at Jhusi: Evidence of Neolithic Culture. *Pragdhara* 13: 223-226.

Narain, A.K. and P.K. Agrawala 1978. *Excavations at Rajghat (1957-58, 1960-65)*. Varanasi: Banaras Hindu University.

Pal, J.N. 1984. Epipalaeolithic Sites in Pratapgarh District Uttar Pradesh. *Man and Environment* 8: 37-38.

Pal, J.N. 1986. *Archaeology of Southern Uttar Pradesh*. Allahabad: Swabha Prakashan.

Pal, J.N. 1994. Mesolithic Settlements in the Ganga Plain. *Man and Environment* 19 (1-2): 91-101.

Pal, J.N. 2002. Mesolithic Gangetic Plain. In *Mesolithic India*. Misra, V.D. and J.N. Pal (eds.): 289-305, Allahabad: University of Allahabad.

Pal, J.N. 2008. The Early Farming Culture of the Middle Ganga Plain with Special Reference to the Excavations at Jhusi and Hetapatti. *Pragdhara* 18: 263-282.

Pant, P.C. 1996. Archaeology and History: Some Problems of Historical Reconstruction. In *Indian Archaeology Since Independence*. K.M. Srimali (ed.): 5-15. Delhi: ASHA.

Pathak, V.N. 1963. *History of Kosala*. Delhi-Varanasi-Patna: Motilal Banarasidass.

Pathak, V.N. 1992. *Bhartiya Itihas Mein Rama* (in Hindi). In *Sri Rama Visvakosa* (in Hindi). B.P. Singh and T.P. Verma (eds.): 112-13. Varanasi: Siddharth Prakashan.

Posssehl, G.L. and P.C. Rissman 1992. The Chronology of Prehistoric India: From Earliest Times to the Iron Age. In *Chronology in Old World Archaeology*, 2 Vols. R.W. Ehrich (ed.), Vol. I: 465-490; Vol. II: 447-474. Chicago and London: The University of Chicago Press.

Prasad, V., M. Sharma, A. Saxena, I.B. Singh 2004. Fossil Diatom Assemblage from Lahuradewa Lacustrine Sediments as Clues for Human Activity. *Abstract: Joint Annual Conference (IAS, ISPQS, IHCS) and National Seminar on the Archaeology of the Ganga Plain (28-31 December 2004)*: 45. Lucknow: Directorate of U.P. State Archaeology.

Pusalkar, A.D. 1965. Traditional History from the Earliest Times to the Accession of Parikshit. In *The Vedic Age*. R.C. Majumdar (ed.): 271-322. Bombay: Bhartiya Vidya Bhawan.

Roy, T.N. 1983. *The Ganges Civilization*. New Delhi: Ramanand Vidya Bhawan.

Saraswat, K.S. 1980. The Ancient Remains of the Crop Plants at Ataranjikhera (c. 2000-1500 BC). *Journal of Indian Botanical Society* 59: 306-319.

Saraswat, K.S. 1986. Ancient Plant Crop Remains from Sringaverpura, Allahabad. *Geophytology* 16 (1): 97-106.

Saraswat, K.S. 1989. Ancient Wood Remains from Sringaverpura, Allahabad (*c*. 1050-700 BC). In *Dimensions in Indian Archaeology and History*. S.K. Pandey and K.S. Ramchandran (eds.): 109-11, New Delhi: Indian History & Culture Society.

Saraswat, K.S. 1992. Archaeobotanical Remains in Ancient Cultural and Socio-Economical Dynamics of the Indian Sub-continent. *Palaeobotanist* 40: 514-45.

Saraswat, K.S. 1993. Seed and Fruit Remains at Ancient Imlidih-Khurd, Gorakhpur: A Preliminary Report. *Pragdhara* 3: 37-41.

Saraswat, K.S. 2001. Research Findings. *News Letter* (June 2001): 4. Lucknow: Birbal Sahni Institute of Palaeobotany.

Saraswat, K.S. 2004a. Plant Economy of Early Farming Communities. In *Early Farming Communities of the Kaimur*. B.P. Singh (ed.): 416-535. Jaipur: Publication Scheme.

Saraswat, K.S. 2004b. Plant Economy in Ancient Malhar. In *Report of the Excavations at Malhar,* *District Chandauli, U.P. 1998-99*. R. Tewari, R.K. Srivastava, K.S. Saraswat, K.K. Singh (eds.): 137-171. Lucknow: Directorate of U.P. State Archaeology.

Saraswat, K.S. 2004c. Plant Economy of Mesolithic Damdama. *Abstract: Joint Annual Conference (IAS, ISPQS, IHCS) and National Seminar on the Archaeology of the Ganga Plain (28-31 December 2004)*: 47. Lucknow: Directorate of U.P. State Archaeology.

Saraswat, K.S. 2005. Agricultural Background of the Early Farming Communities in the Middle Ganga Plain. *Pragdhara* 15: 145-177.

Saraswat, K.S. and A.K. Pokharia 2003. Palaeoethnobotanical Investigations of Early Harappan Kunal. *Pragdhara* 13: 105-139.

Saraswat, K.S. and A.K. Pokharia 2004. Plant Economy at Lahuradewa – A Preliminary Contemplation. *Abstract: Joint Annual Conference (IAS, ISPQS, IHCS) and National Seminar on the Archaeology of the Ganga Plain (28-31 December 2004)*: 46-47. Lucknow: Directorate of U.P. State Archaeology.

Saraswat, K.S. *Annual Reports*: 1994-95; 1995-96; 1996-97; 1997-98. Lucknow: Birbal Sahni Institute of Palaeobotany.

Saraswat, K.S., N.K. Sharma and D.C. Saini 1994. Plant Economy at Ancient Narhan. In *Excavations at Narhan* (1984-89). P. Singh (ed.): 255-346. Varanasi and Delhi: Banaras Hindu University and B.R. Publishing Corporation.

Sathe, V. and G.L. Badam 2004. Faunal Remains. In *Early Farming Communities of the Kaimur*, Vol. II. B.P. Singh (ed.): 536-584. Jaipur: Publication Scheme.

Savithri, R. 1976. *Studies in Archaeobotany Together with its Bearings upon Socio-Economy and Environment of Indian Proto-Historic Cultures*. Ph.D. Thesis (Unpublished). Lucknow: University of Lucknow.

Saxena, A., V. Prasad, M. Sharma, I.B. Singh 2004. Phytoliths in Lahuradewa Lake Sediments as Indicator of Palaeovegetation and Rice Cultivation During Holocene. *Abstract: Joint Annual Conference (IAS, ISPQS, IHCS) and National Seminar on the Archaeology of the Ganga Plain (28-31 December 2004)*: 47-48. Lucknow: Directorate of U.P. State Archaeology.

Sharma, S., M. Joachimski, M. Sharma, H.J. Tobschall, I.B. Singh, C. Sharma, M.S. Chauhan and G. Morgenroth 2004. Late Glacial and Holocene Environmental Changes in Ganga Plain, Northern India. *Quaternary Science Reviews* 23 (1-2): 145-159.

Sharma, S., M. Joachimski, M. Sharma, H.J. Tobschall, I.B. Singh, C. Sharma and M.S. Chauhan 2006. Correlative Evidences of Monsoon Variability, Vegetation Change and Human Inhabitation in Sanai Lake Deposit: Ganga Plain, India. *Current Science* 90: 973-978.

Sharma, A. 1983. *Further Contributions to the Palaeobotanical History of the Crops*. Ph.D. Thesis (Unpublished). Lucknow: University of Lucknow.

Sharma, C., M.S. Chauhan, S. Sharma, M. Sharma and I.B. Singh 2001. Proxy Records of Holocene Vegetation and Climate Change from Sanai Tal, Central Ganga Plain, Uttar Pradesh. *National Symposium: Role of Earth Sciences Integrated Development and Related Social Issues*. Special Publication No. 65 (3): 199-202. New Delhi: Geological Survey of India.

Sharma, G.R. 1975. Seasonal Migrations and Mesolithic Lake Cultures of the Ganga Valley. In *K.C. Chattopadhyaya Memorial Volume*. G.R. Sharma (ed.): 1-20. Allahabad: University of Allahabad.

Sharma, G.R. 1985. From Hunting and Food Gathering to Domestication of Plants and Animals in the Belan and Ganga Valleys. In *Recent Advances in Indo-Pacific Prehistory*. V.N. Misra and P. Bellwood (eds.): 369-371. New Delhi-Bombay-Calcutta: Oxford & IBH Publication Company.

Sharma, G.R., V.D. Misra, D. Mandal, B.B. Misra and J.N. Pal 1980. From Hunting and Food-Gathering to Domestication of Plants and Animals – Epi-Palaeolithic to Neolithic-Excavation at Chopani-Mando, Mahadaha and Mahagara. *History and Archaeology* 1: 1-232. Allahabad: University of Allahabad.

Sharma, M., V. Prasad, A. Saxena and I.B. Singh 2004. Microscopic Charcoal in Lacustrine Sediments of Lahuradewa, as Evidence of Human Activity. *Abstract: Joint Annual Conference (IAS, ISPQS, IHCS) and National Seminar on the Archaeology of the Ganga Plain (28-31 December 2004)*: 48-49. Lucknow: Directorate of U.P. State Archaeology.

Sharma, N.K. 1989. *Palaeobotanical Studies at Narhan, District Gorakhpur, U.P. (c. 1,000 B.C. - 400 A.D.)*. Ph.D. Thesis (Unpublished). Lucknow: Birbal Sahni Institute of Palaeobotany.

Sharma, Y.D. 1985. Bahadarabad. In *An Encyclopaedia of Indian Archaeology*. A. Ghosh (ed.): 37-38. New Delhi: Munshiram Manoharlal.

Singh, A.K. 2006. Fresh Light on the Antiquity of Varanasi (With Special Reference to Excavations at Aktha and Sarai Mohana). *Pragdhara* 16: 69-79.

Singh, B.P. 1985-86. Excavations at Khairadih. *Journal of Bihar Puravid Parishad* 9 & 10: 78-86.

Singh, B.P. 1990. Early Farming Communities of Kaimur Foot-Hills. *Puratattva* 19: 6-18.

Singh, B.P. 2004. *Early Farming Communities of the Kaimur* I & II. Jaipur: Publication Scheme.

Singh, B.P. and A.K. Singh 2004. Excavations at Sarai Mohana (1967-68). *Bharati* (*Bulletin of the Dept. of AIHC and Archaeology, BHU*) 27: 1-120.

Singh, B.P. and R. Kumar 1994. Explorations in District Basti and Siddharthnagar in the Sarayupar Plains of Eastern Uttar Pradesh. *Pragdhara* 4: 1-12.

Singh, I.B. 2001. Proxy Records of Neotectonics, Climate Changes and Anthropogenic Activity in the Late Quaternary of Ganga Plain. *National Symposium Role of Earth Science: Integrated Development and Related Science Issues*, Government of India Series, Geological Survey of India, Special Publication 65 (1), xxxiii - l.

Singh, I.B. 2002. Late Quaternary Evolution of Ganga Plain and Proxy Records of Climate Change and Anthropogenic Activity. *Pragdhara* 12: 1-25.

Singh, I.B. 2004a. Late Quaternary History of the Ganga Plain. *Journal of the Geological Society India* 64: 431-454.

Singh, I.B. 2004b. Quaternary Palaeoenvironments of the Ganga Plain and Anthropogenic Activity. *Presidential Address, Indian Society for Prehistoric and Quaternary Studies Meeting* (28-31 December 2004). Lucknow.

Singh, I.B., S. Sharma, M. Sharma, P. Srivastava, G. Rajagopalan 1999. Evidence of Human Occupation and Humid Climate of 30 Ka in the Alluvium of Southern Ganga Plain. *Current Science* 76: 1022-1026.

Singh, P. 1992. Neolithic-Chalcolithic Cultures of Eastern Uttar Pradesh. In *Archaeological Perspective of Uttar Pradesh and Future Prospects*. R. Tewari (ed.): 67-76. Lucknow: U.P. State Archaeological Organisation.

Singh, P. 1993. Archaeological Excavations at Imlidih Khurd –1992. *Pragdhara* 3: 21-35.

Singh, P. 1994a. Further Excavations at Imlidih Khurd – 1993. *Pragdhara* 4: 41-48.

Singh, P. 1994b. *Excavations at Narhan (1984-89)*. Delhi & Varanasi: Banaras Hindu University & B.R. Corporation.

Singh, P. 1996. Prelude to Urbanization in the Sarayupar Plain. *Presidential Address, Indian History Congress* (Fifty-seventh Session, Section V) held in Chennai (pre-circulated printed paper).

Singh, P. 2003. Archaeology of the Middle Ganga Plain. *Man and Environment* XXVIII (1): 1-6.

Singh, P., A.K. Singh and R.N. Singh 1997. Explorations Along the Choti Sarayu (Tons) River. *Pragdhara* 7: 33-50.

Singh, P. and A.K. Singh 1998. Excavations at Bhunadih, District Ballia (U.P.). *Pragdhara* 8: 11-29.

Singh, P. and A.K. Singh 1996. Excavations at Waina, District Ballia (U.P.). *Pragdhara* 6: 41-61.

Singh, P. and A.K. Singh 2000. Excavations at Agiabir, District Mirzapur (Uttar Pradesh). *Pragdhara* 10: 31-55.

Singh, P., A.K. Singh and B. Singh 1995. Archaeological Investigations in Ballia (U.P.). *Pragdhara* 5: 41-61.

Singh, P., A.K. Singh and I. Singh 1991. Exploration Along the Kuwana River in District Gorakhpur and Basti. *Pragdhara* 1: 69-82.

Singh, P., A.K. Singh and I. Singh 1992. On the Trails of Narhan Culture. *Pragdhara* 2: 33-34.

Singh, P., R. Tewari and R.N. Singh 2000. Explorations in Chandauli District (U.P.) 1999-2000: A Preliminary Report. *Pragdhara* 10: 135-148.

Singh, R.L. 1971. *India - A Regional Geography*. Varanasi: National Geographical Society of India.

Srivastava, K.M. 1986. *Discovery of Kapilavastu*. New Delhi: Books & Books.

Srivastava, K.M. 1996. *Excavations at Piprahwa and Ganwaria*. New Delhi: Archaeological Survey of India.

Tewari, D.P. 1999. Archaeological Exploration in Nawabganj Tehsil of District Barabanki (U.P.). *Pragdhara* 9: 57-64.

Tewari, R. 1998. In Quest of Early Iron Age Sites in Karamnasa Valley. *Pragdhara* 8: 57-67.

Tewari, R. 2003. The Origins of Iron-working in India: New Evidence from the Central Ganga Plain and the Eastern Vindhyas. *Antiquity* 77 (297): 536-544: http://antiquity.ac.uk/ProjGall/298.html.

Tewari, R. 2004. The Myth of Dense Forests and Human Occupation in the Ganga Plain. *Man and Environment* 29 (2): 102-116.

Tewari, R. and B.R. Mani 1996. Further Archaeological Investigation in Sarayupar Area. *Pragdhara* 6: 149-168.

Tewari, R. and G.C. Singh 2001. Exploration in District Mirzapur (Uttar Pradesh): 1999-2000. *Pragdhara* 11: 91-104.

Tewari, R. and R.K. Srivastava 1994a. Exploration along the Ami River and its Nearby Areas in Districts Siddharthnagar, Basti and Gorakhpur. *Pragdhara* 4: 13-40.

Tewari, R., P.C. Pant, I.B. Singh, S. Sharma, M. Sharma, P. Srivastava, A.K. Singhvi, P.K. Mishra and H.J. Tobschall 2002b. Middle Palaeolithic Human Activity and Palaeoclimate at Kalpi in Yamuna Valley, Ganga Plain. *Man and Environment* 27 (2): 1-13.

Tewari, R., R.K. Sirivastava, K.K. Singh, R. Vinay, R.K. Trivedi, G.C. Singh 2005. Recently Excavated Sites in the Ganga Plain and North Vindhyas: Some Observations Regarding the Pre-Urban Context. *Pragdhara* 15: 39-49.

Tewari, R., R.K. Srivastava, K.K. Singh, K.S. Saraswat, I.B. Singh, M.S. Chauhan, A.K. Pokharia, A. Saxena, V. Prasad, M. Sharma 2006. Second Preliminary Report of the Excavations at Lahuradewa, District Sant Kabir Nagar, U.P., 2002-2003-2004 & 2005-06. *Pragdhara* 16: 35-68.

Tewari, R., R.K. Srivastava, K.K. Singh, K.S. Saraswat, I.B. Singh 2003. Preliminary Report of the Excavation at Lahuradewa, District Sant Kabir Nagar, U.P. 2001-2002: Wider Archaeological Implications. *Pragdhara* 13: 37-68.

Tewari, R., R.K. Srivastava, K.K. Singh, K.S. Saraswat, I.B. Singh, M.S. Chauhan, B. Shekar, A.K. Pokharia, A. Saxena, V. Prasad, M. Sharma and P.P. Joglekar 2004b. Epilogue: Implications for the Archaeological Studies in Ganga Plain. *Abstract: Joint Annual Conference (IAS, ISPQS, IHCS) and National Seminar on the Archaeology of the Ganga Plain (28-31 December 2004)*: 59-60. Lucknow: Directorate of U.P. State Archaeology.

Tewari, R., R.K. Srivastava, K.S. Saraswat, K.K. Singh 2004a. *Report of the Excavations at Malhar, District Chandauli, U.P. 1998-99*. Lucknow: Directorate of U.P. State Archaeology.

Tewari, Rakesh. R.K. Srivastava, K.S. Saraswat, I.B. Singh, K.K. Singh 2008. Early Farming at Lahuradewa. *Pragdhara* 18: 347-373.

Upadhyay, P. 2006. Ancient Cultures of the Middle Ganga Plain and their Mineral Correlations. *Pragdhara* 16: 133-153.

Verardi, G. 2007. *Excavations at Gotihawa and Pipri Kapilabastu District Nepal*. Roma: Istituto Italiano per l'Africa e l'Oriente, Centro scavi e ricerche archeologiche.

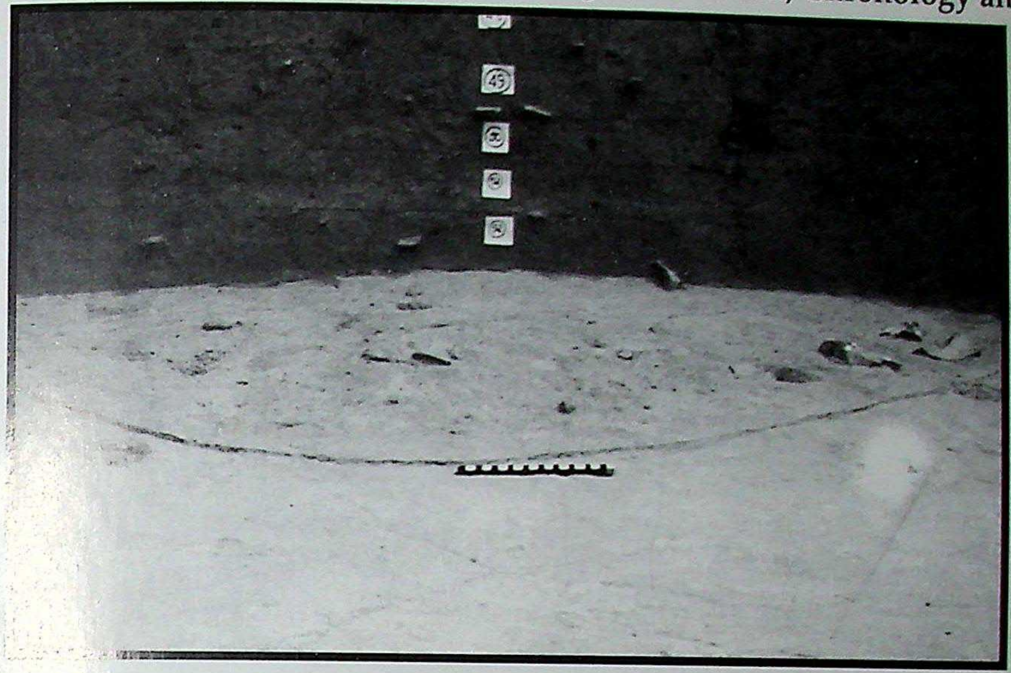
Vishnu Mittre 1972. Neolithic Plant Economy at Chirand. *Palaeobotanist* 21: 18-22.

Vishnu Mittre 1974. Palaeobotanical Evidence in India. In *Evolutionary Studies in World Crops: Diversity and Change in the Indian Subcontinent*. S.J. Hutchinson (ed.): 3-30. Cambridge: Cambridge University Press.

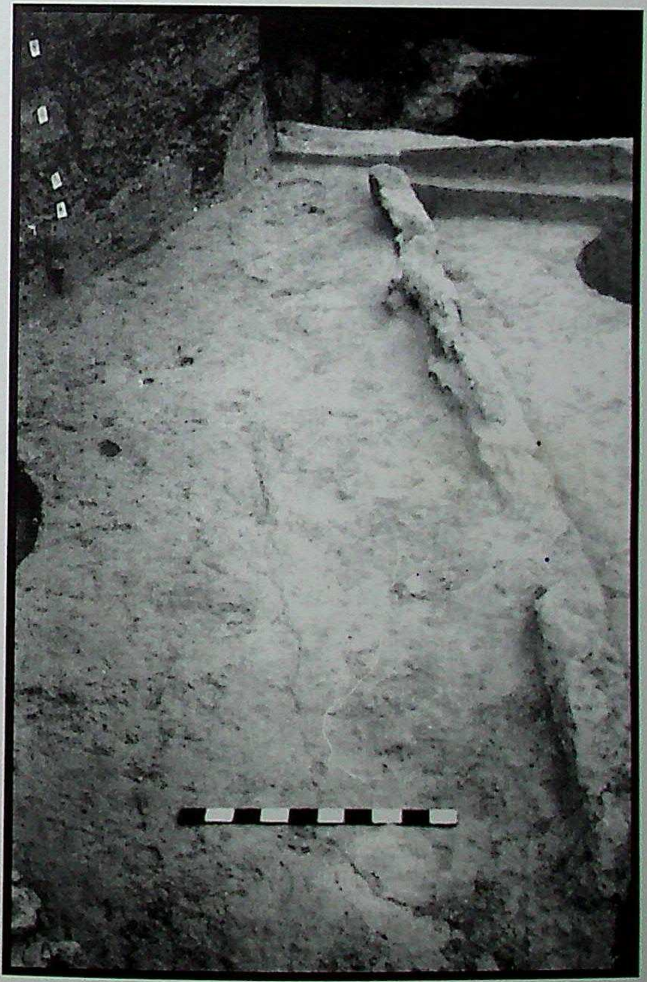
Vishnu Mittre 1975. The Archaeobotanical and Palynological Evidence for the Early Origin of Agriculture in South and Southeast Asia. In *Gastronomy: The Anthropology of Food Habitat*. M.L. Arnott (ed.): 13-22. The Hague: Mouton.

Vishnu Mittre 1978. Origins and History of Agriculture in the Indian Subcontinent. *Journal of Human Evolution* 7: 21-36.

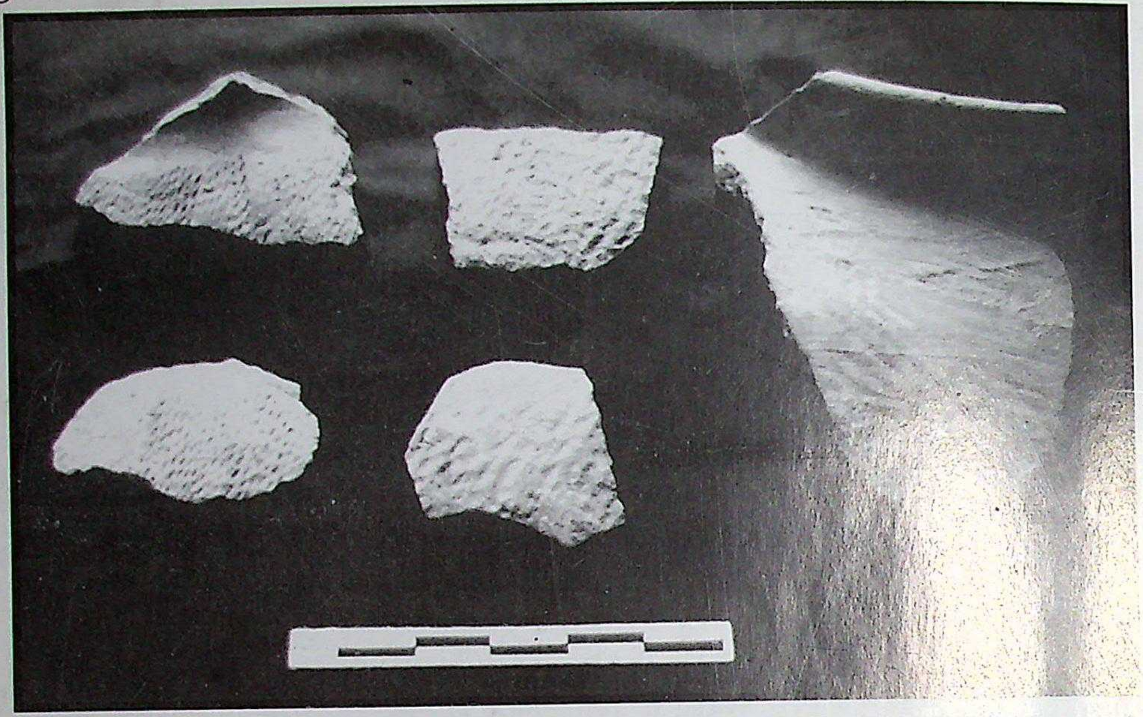
पुस्तकालय
147624



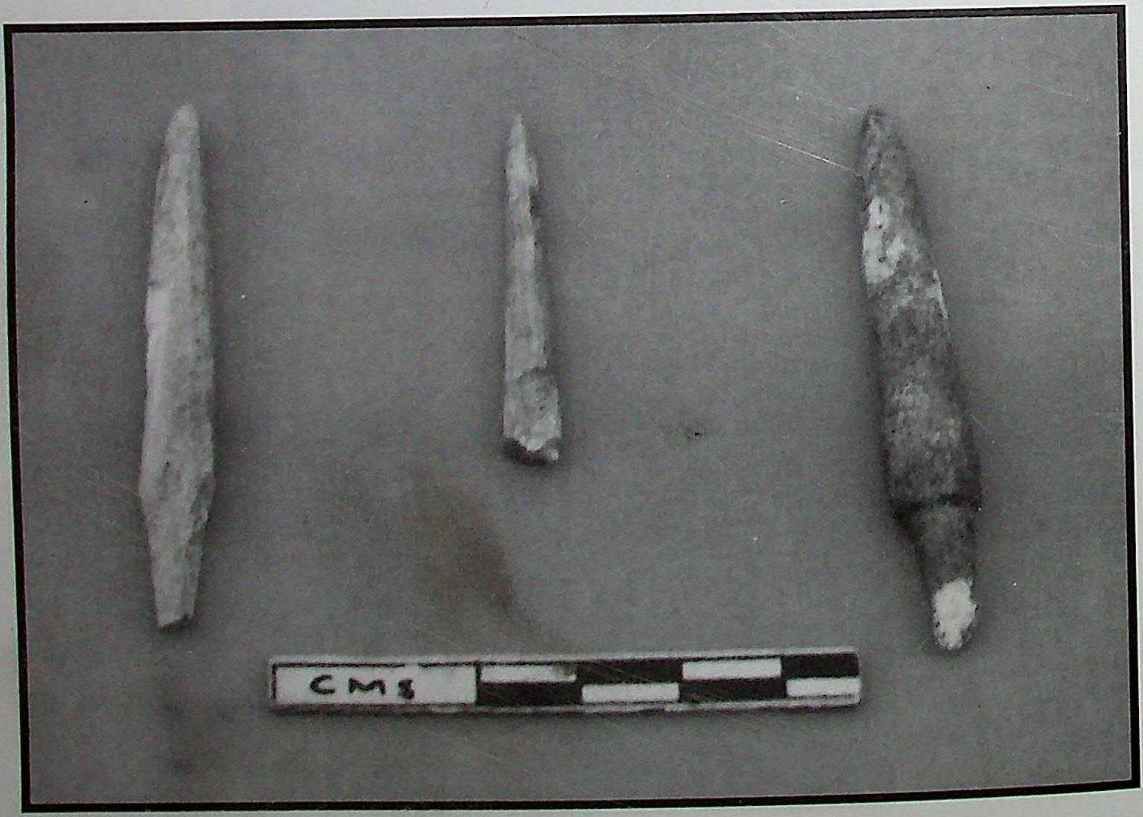
Illus. 1. Hut floor, Jhusi



Illus. 2. A burnt plastered floor enclosed by two parallel mud walls, Jhusi



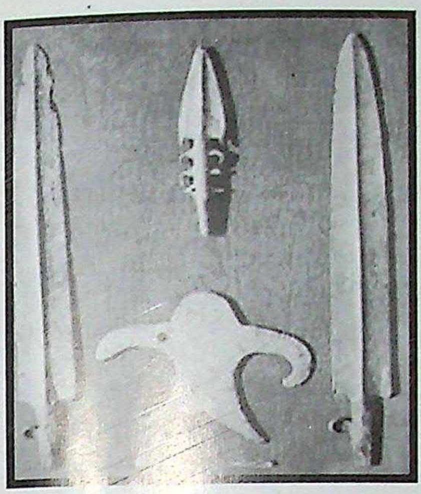
Illus. 3. Cording pattern on pottery, Jhusi



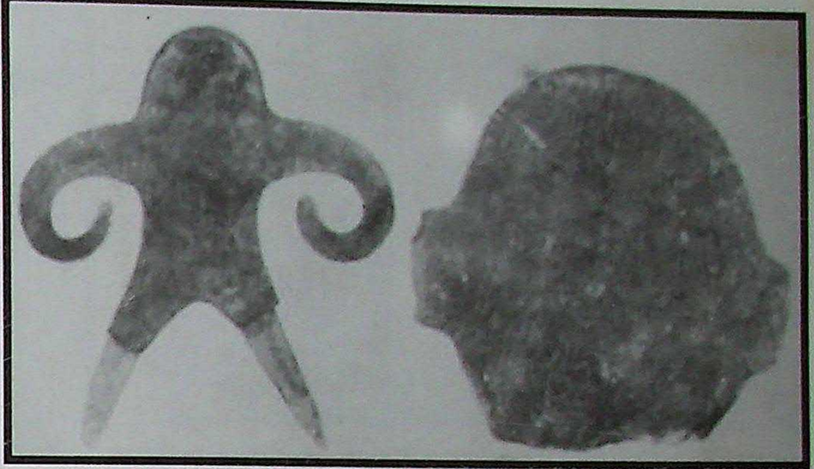
Illus. 4. Bone arrowheads, Jhusi

D.P. Sharma, Madhuri Sharma and Ajit Kumar Choudhary

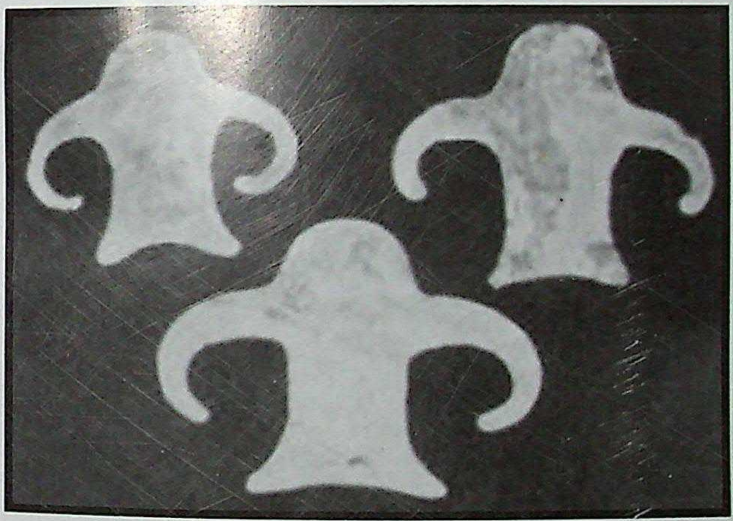
New Copper Hoard in Upper Ganga Plain



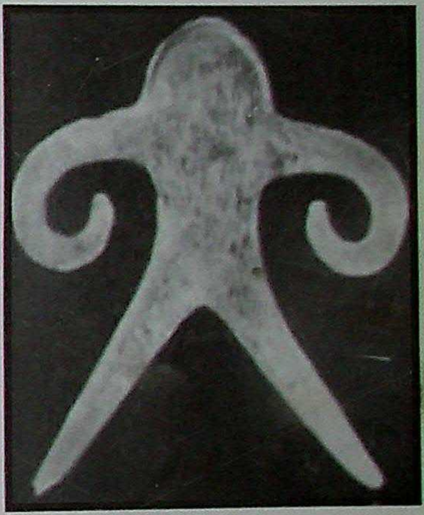
Illus. 1. Copper anthropomorphic figure of type-I long arm and short leg type, harpoon, hooked swords from Sapai excavation



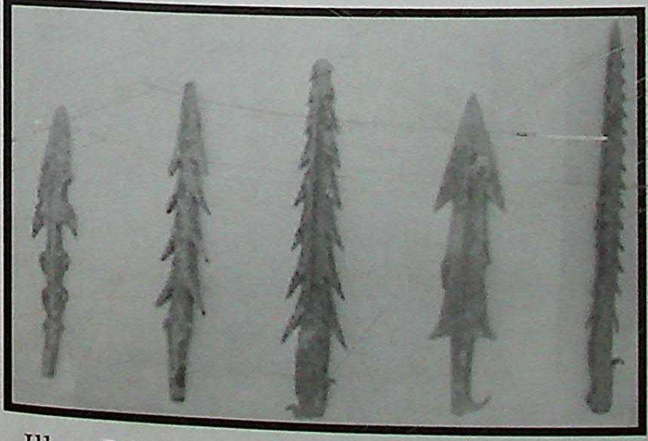
Illus. 2. Copper anthropomorphic figure of type-II long leg, short arm type from Chandausi



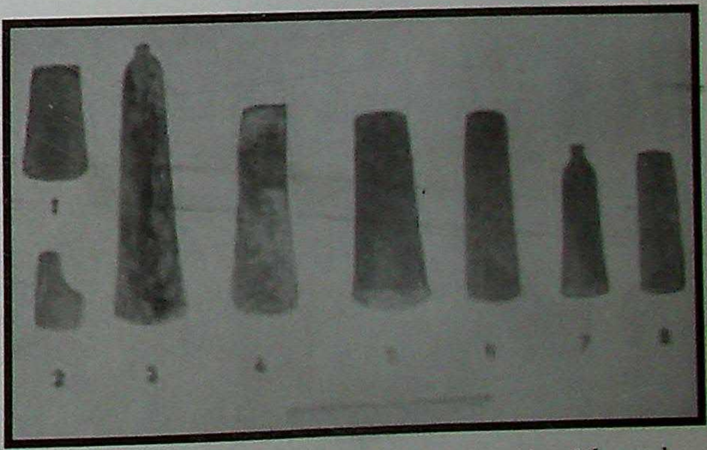
Illus. 3. Three copper anthropomorphic figure of type-IV long arms without legs from Madarpur



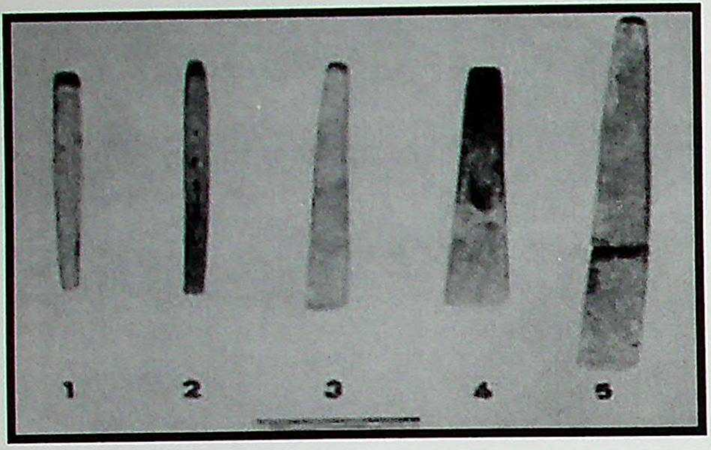
Illus. 4. Copper anthropomorphic figure of type-II long legs and short arms type from Bisauli



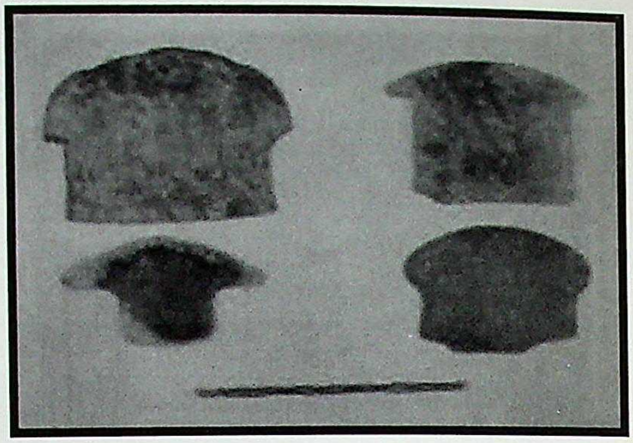
Illus. 5 (a-b). Copper harpoons of type-III, barbs on tip to shaft from Rewari



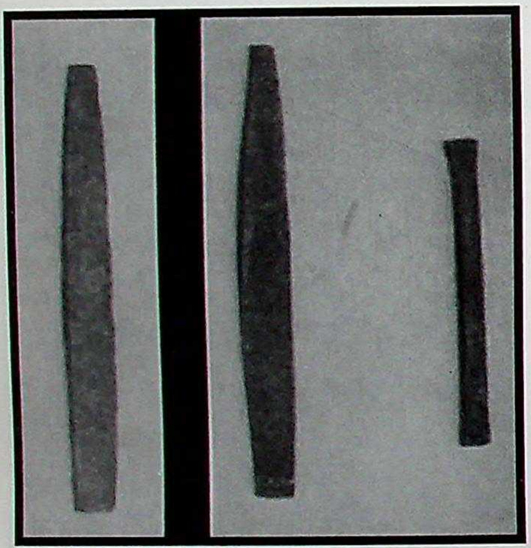
Illus. 6. Copper weed chisel or *kurpi*, with and without tang and from different sites of middle Ganga-Yamuna doab



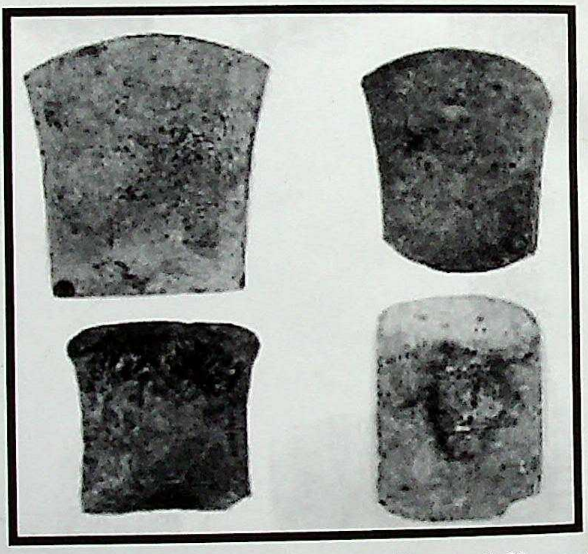
Illus. 7. Copper shouldered axes of different shape from sites of middle Ganga-Yamuna doab



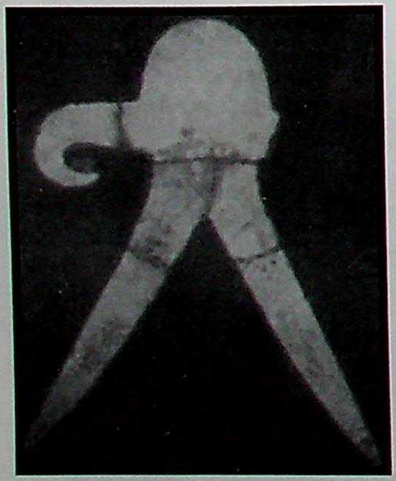
Illus. 8. Copper chisels from different sites of Ganga-Yamuna doab



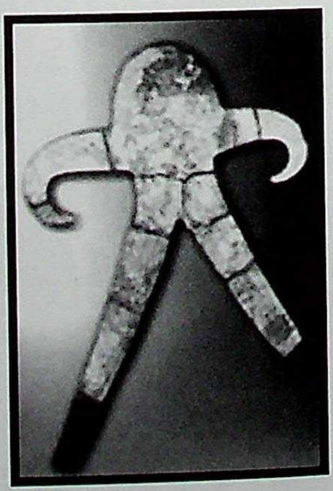
Illus. 9 (a-b). Copper bar axes from different sites of Haryana



Illus. 10. Copper flat axes from different sites of lower Ganga-Yamuna doab

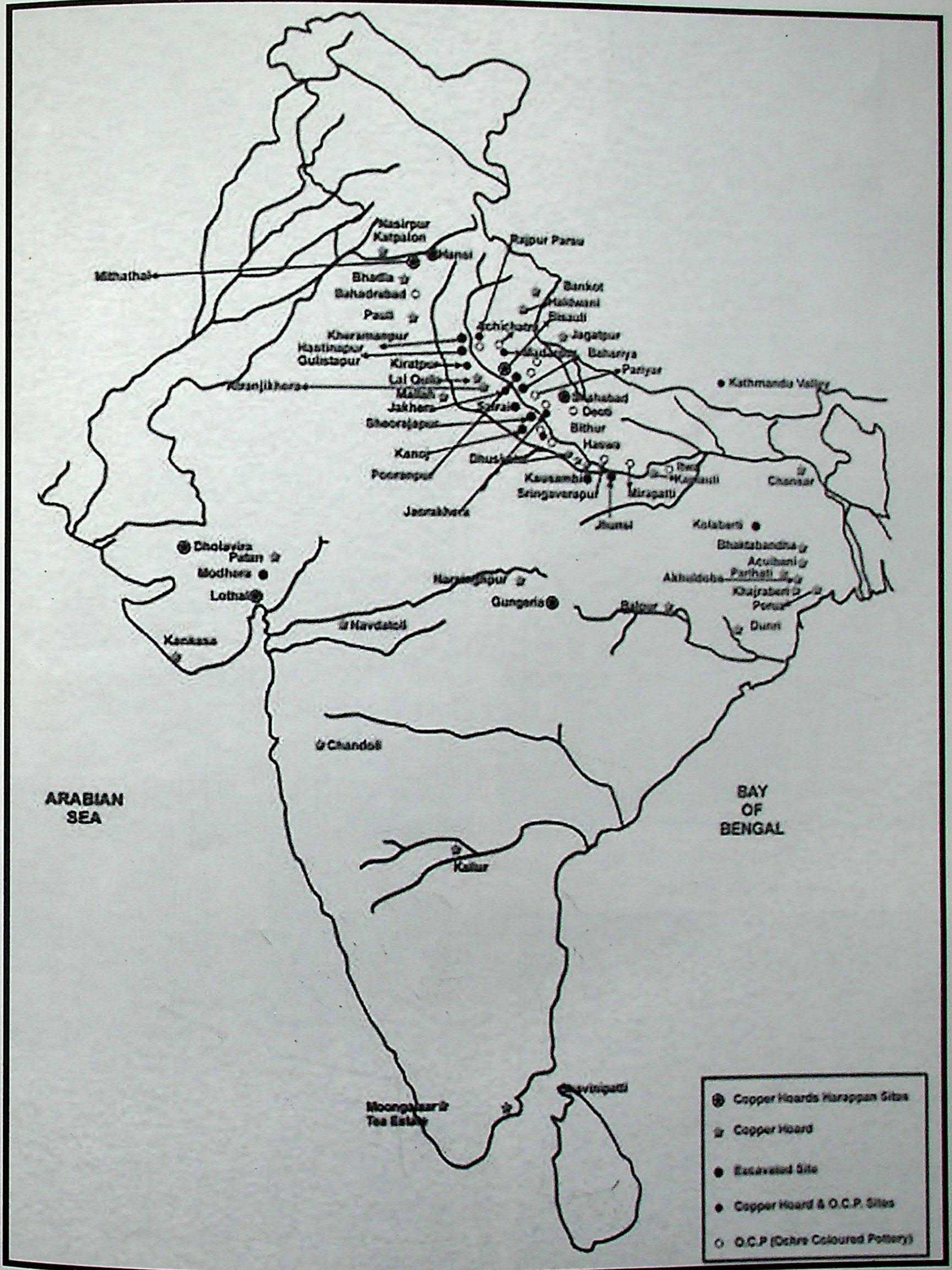


Illus. 12. Anthropomorphic figure of type-one arm missing, Jaorakhera

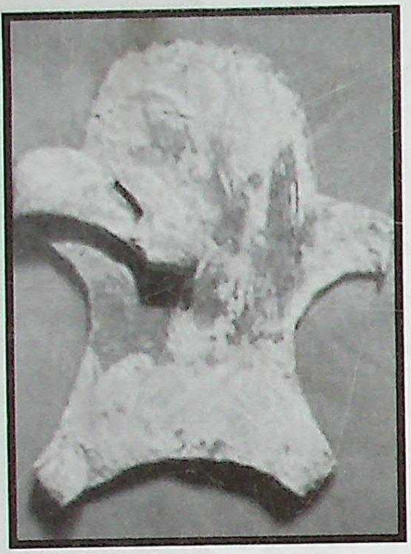


Illus. 13. Anthropomorphic figure of type-I short arms and long leg type doab area

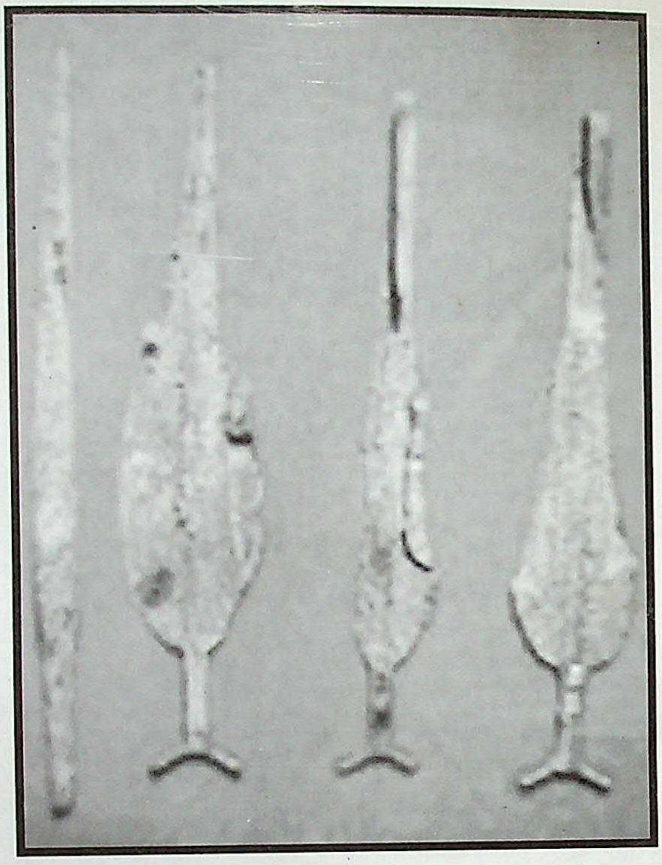
D.P. Sharma, Madhuri Sharma and Ajit Kumar Choudhary
New Copper Hoard in Upper Ganga Plain


Nasirpur
Katpalon
Hansi
Rajpur Parsu
Mithathal
Bhadla
Bahadrabad
Pauli
Bankot
Haldwani
Bisauli
Ahichatra
Jagatpur
Kheramanpur
Hastinapur
Gulistapur
Madarpur
Baharya
Kiratpur
Pariyar
Lal Qila
Atranjikhera
Mallah
Kathmandu Valley
Shahabad
Jakhera
Saipai
Deco
Sheorajapur
Bithur
Hasava
Kanoj
Dhusiana
Itwa
Kapsauli
Pooranpur
Kausambi
Chansar
Sringaverapur
Mirapatti
Jasrakhera
Jhunsi
Kolaberti
Dholavira
Patan
Bhaktabandha
Modhera
Aculbani
Akhuldoba
Parihati
Harsinghpur
Khajraberi
Lothal
Gungeria
Porua
Bajpur
Navdatoli
Dunri
Kankasa
Chandoli
ARABIAN SEA
BAY OF BENGAL
Kallur
Kavinipatti
Moongaasar Tea Estate
Copper Hoards Harappan Sites
Copper Hoard
Excavated Site
Copper Hoard & O.C.P. Sites
O.C.P (Ochre Coloured Pottery)

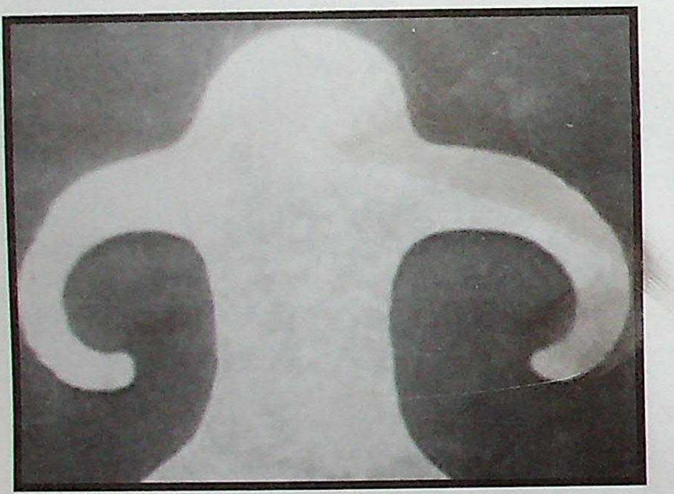
Illus. 11. Ochre coloured ceramic and Copper Hoard sites



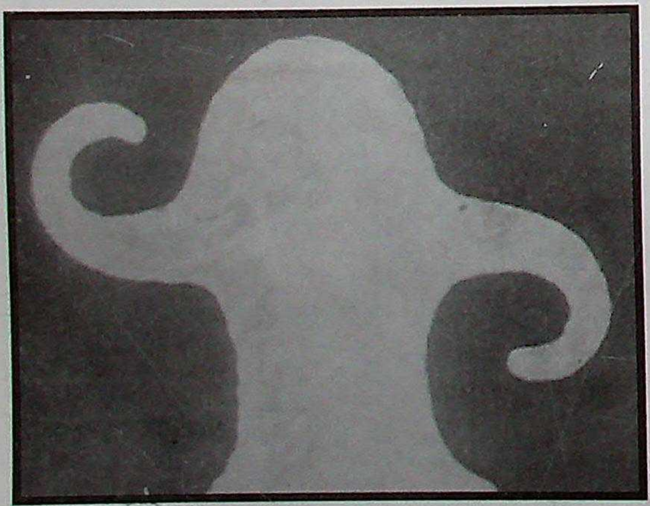
Illus. 14. Anthropomorphic shape Shani Devata Ganga-Yamuna doab



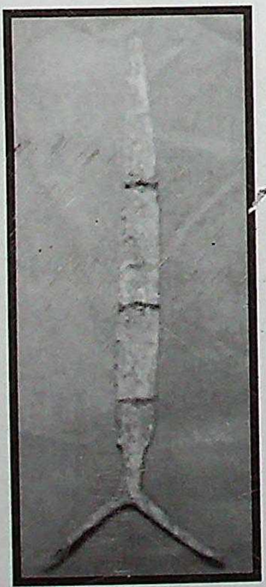
Illus. 17. Group of antennae sword from lower Ganga-Yamuna doab



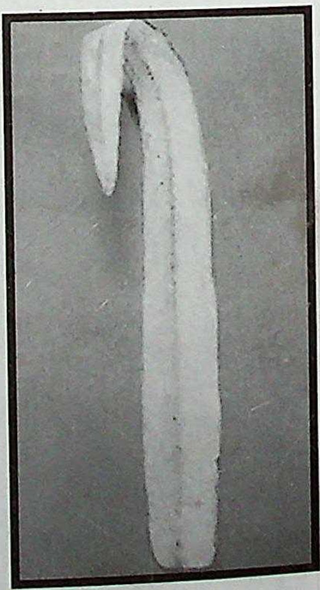
Illus. 15. Anthropomorphic figure of type-IV Badau



Illus. 16. Anthropomorphic figure of type-IV Badau



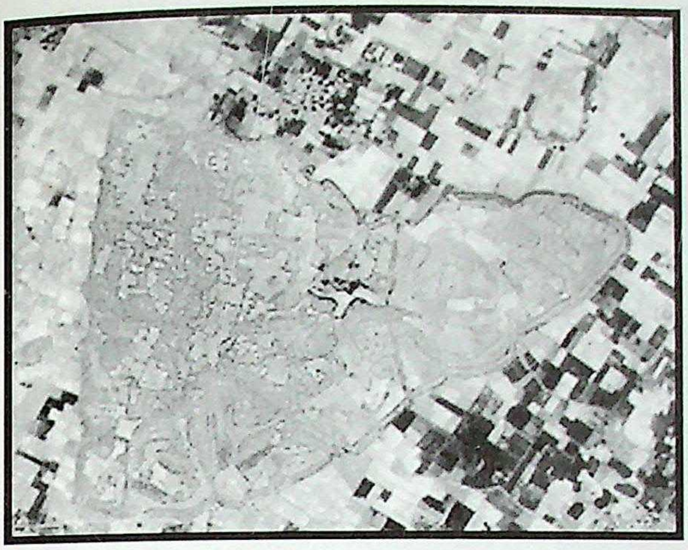
Illus. 18. Antennae sword from lower Ganga-Yamuna doab



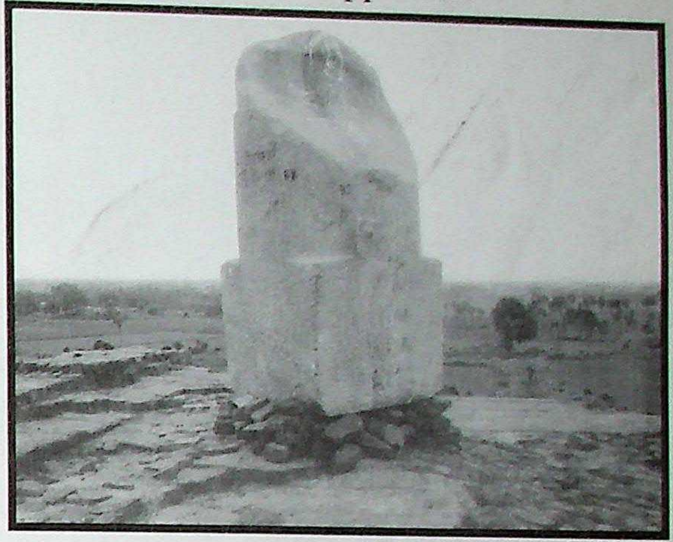
Illus. 19. Antennae sword from Sahabad Ganga-Yamuna doab

D.N. Dimri

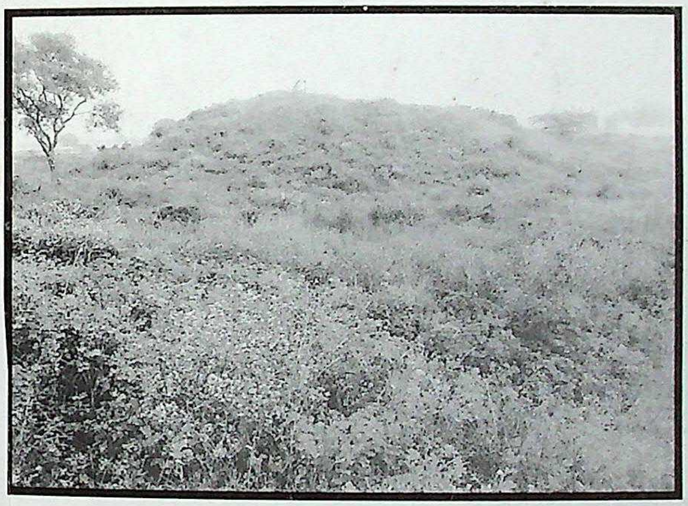
Recent Archaeological Discoveries at Ahichchhatra: An Appraisal



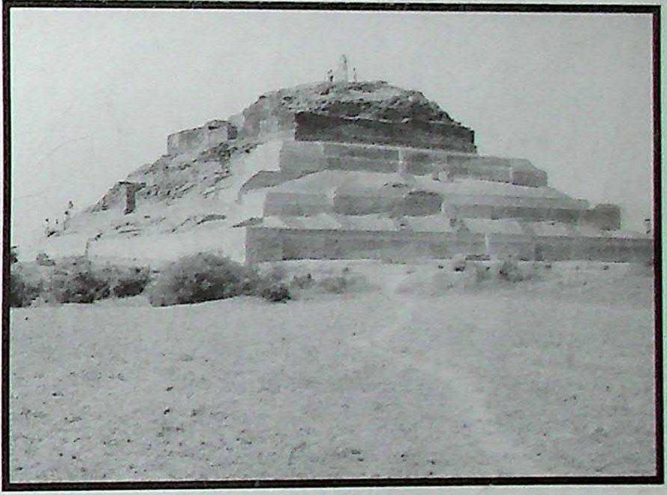
Illus. 1. Satellite image of Ahichchhatra



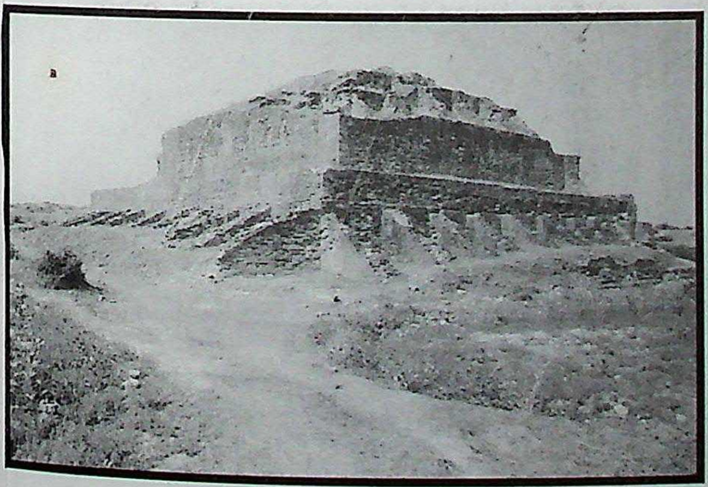
Illus. 2. A view of stone lingam



Illus. 3. View of *stupa* mound



Illus. 4. View of Temple I

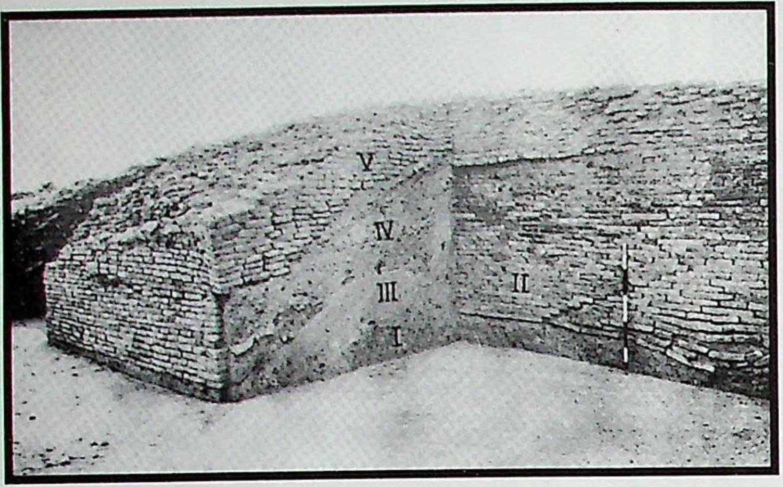


Illus. 5. View of Temple II

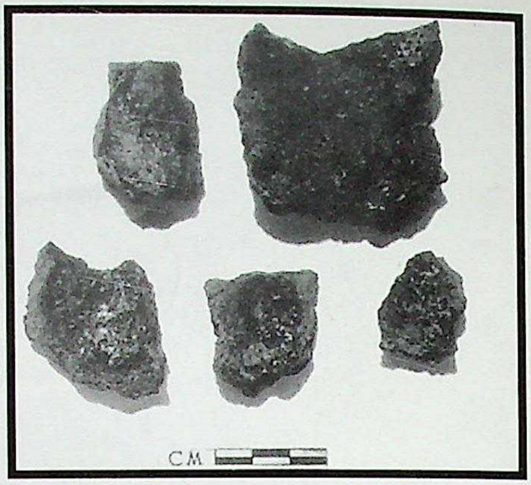
Illus. 6. View of fort wall

D.N. Dimri

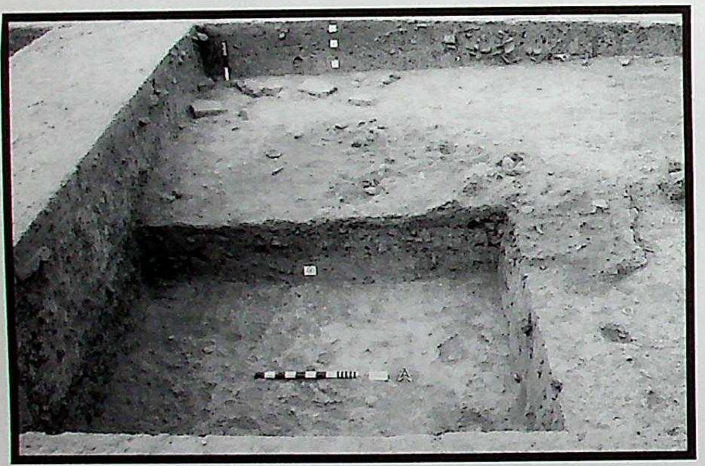
Recent Archaeological Discoveries at Ahichchhatra: An Appraisal



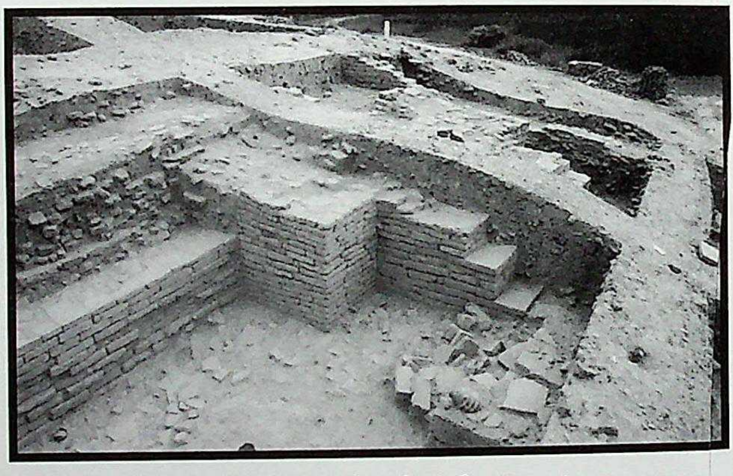
Illus. 7. View of excavated fort wall



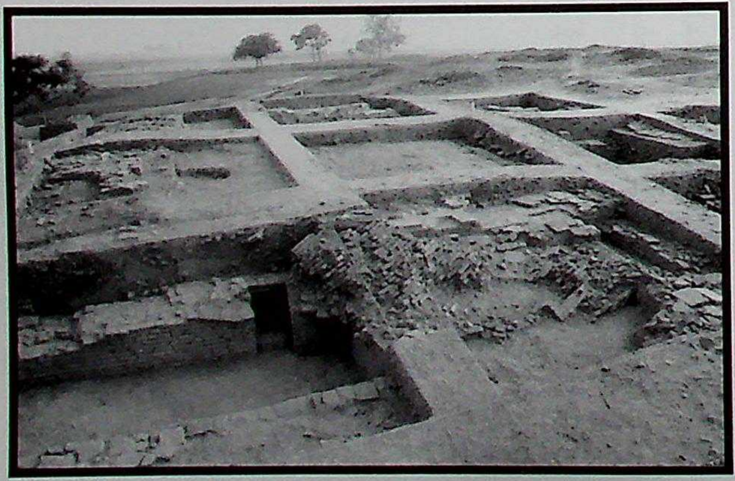
Illus. 8. Crucibles



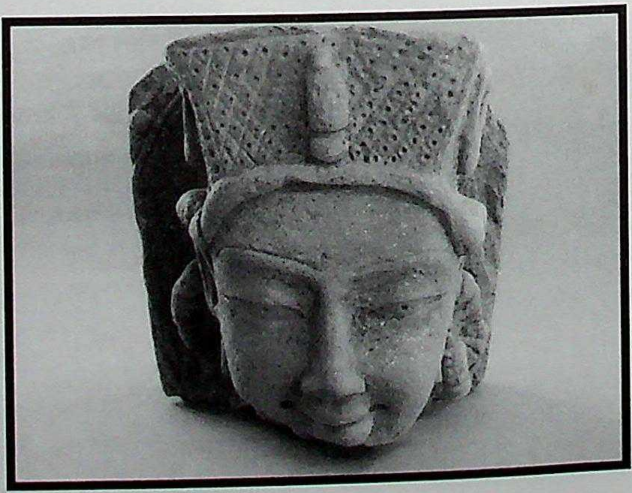
Illus. 9. Section showing the deposit of crucibles and waste



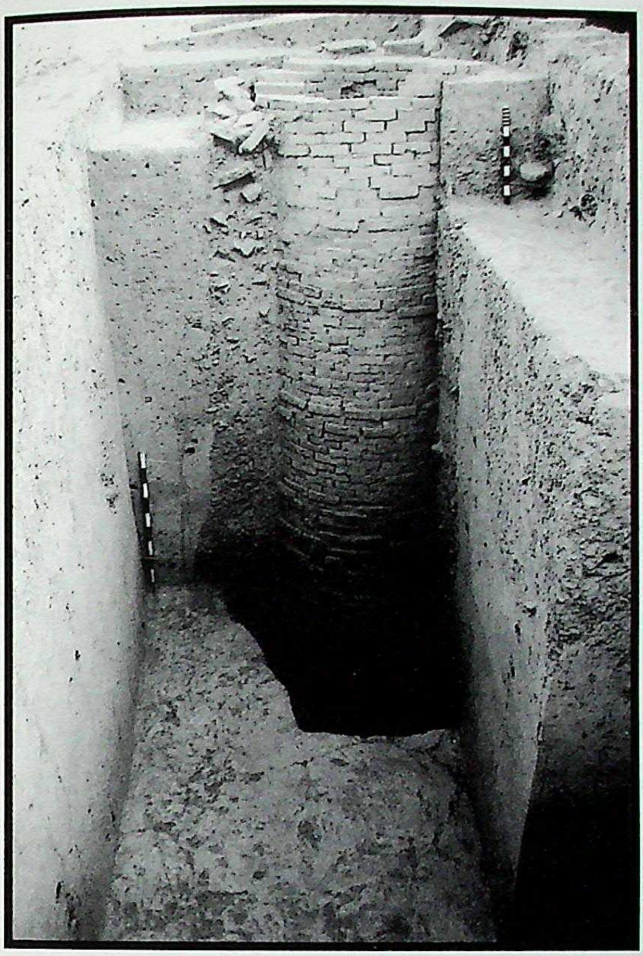
Illus. 10. Massive brick structure



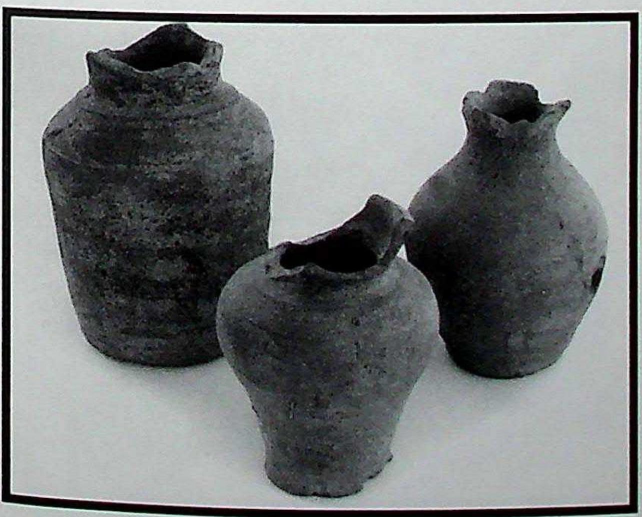
Illus. 11. A view of excavated structure



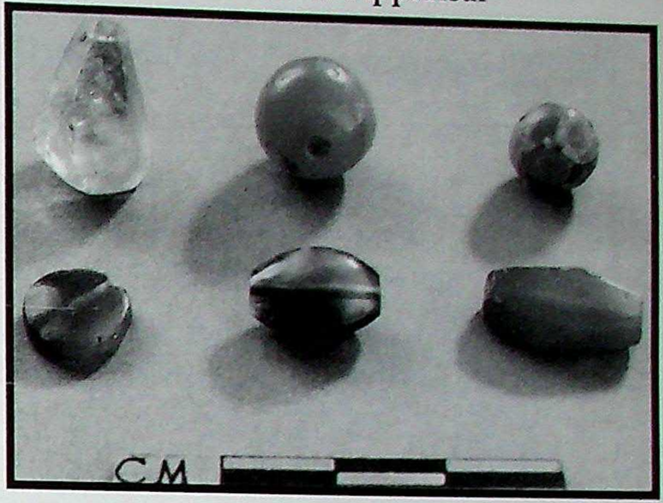
Illus. 13. Human head



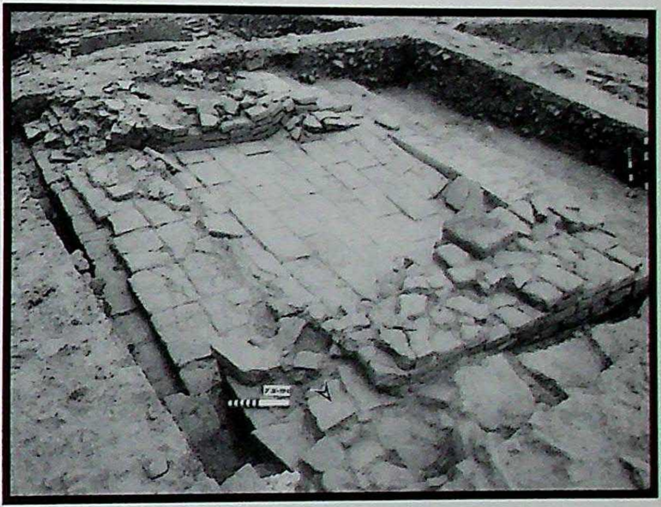
Illus. 12. Brick well



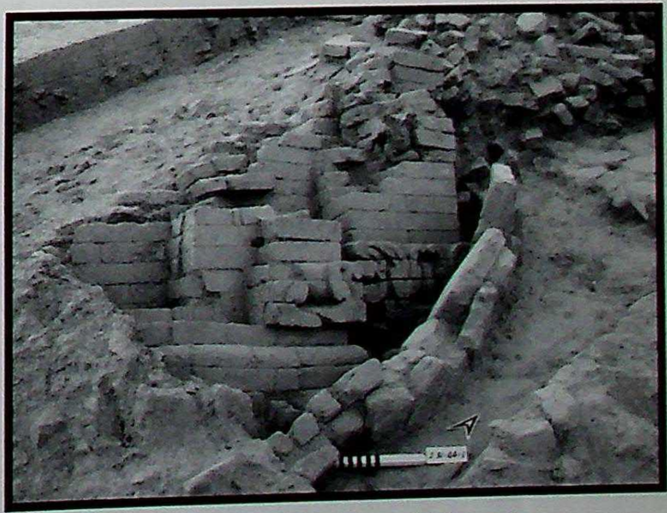
Illus. 17. Pots



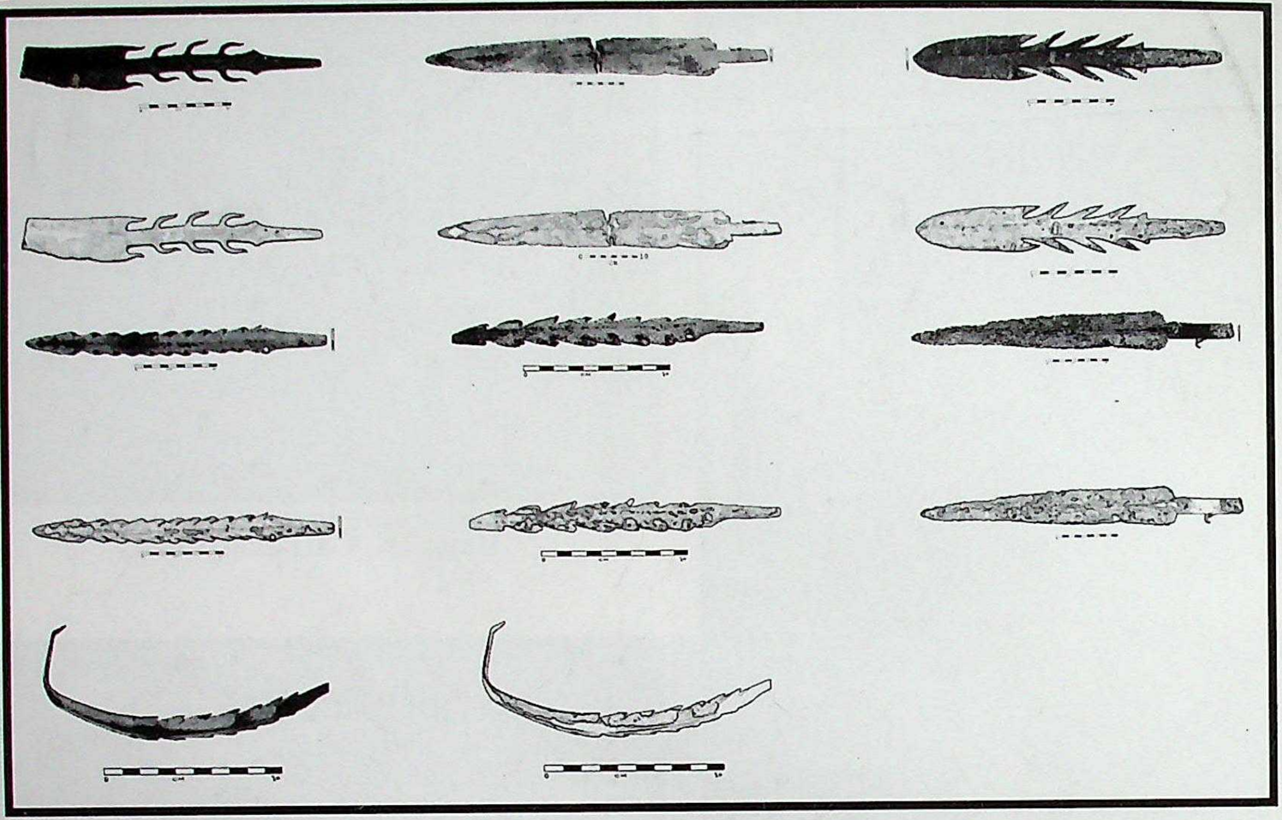
Illus. 14. Carnelian beads



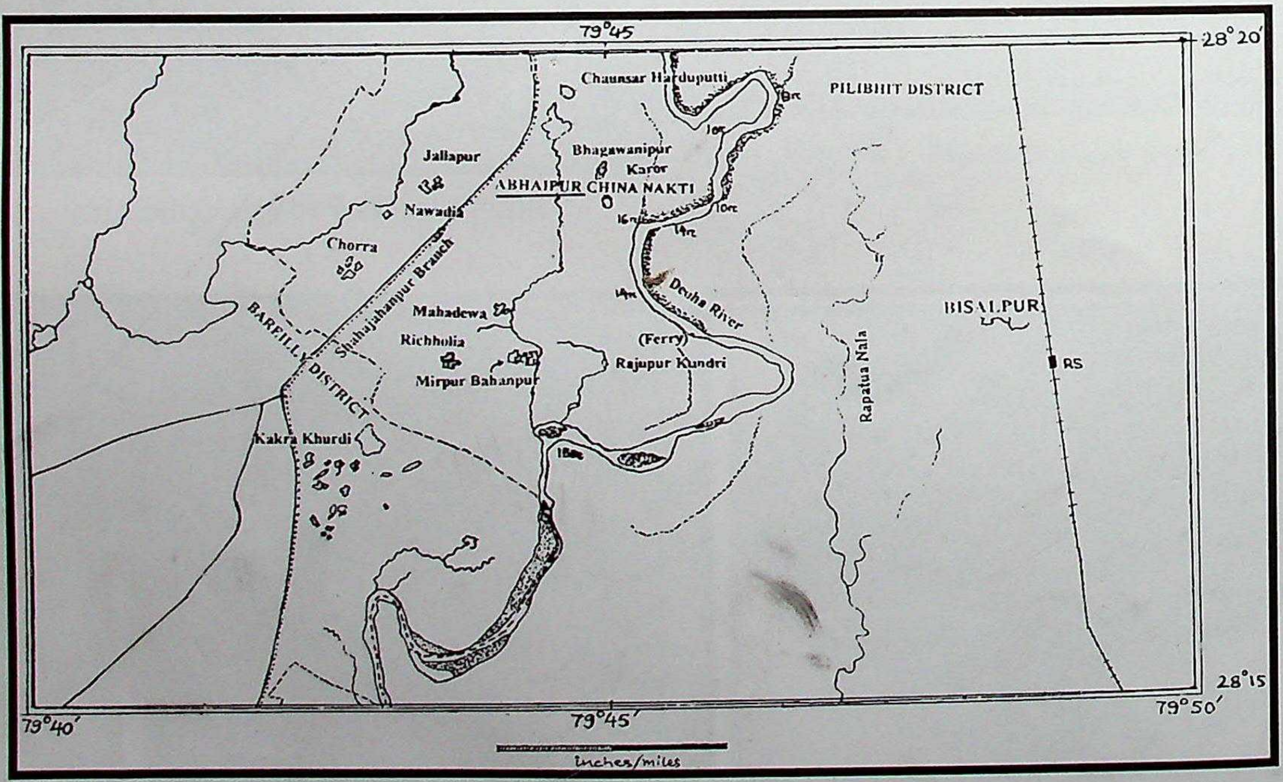
Illus. 15. View of brick platform



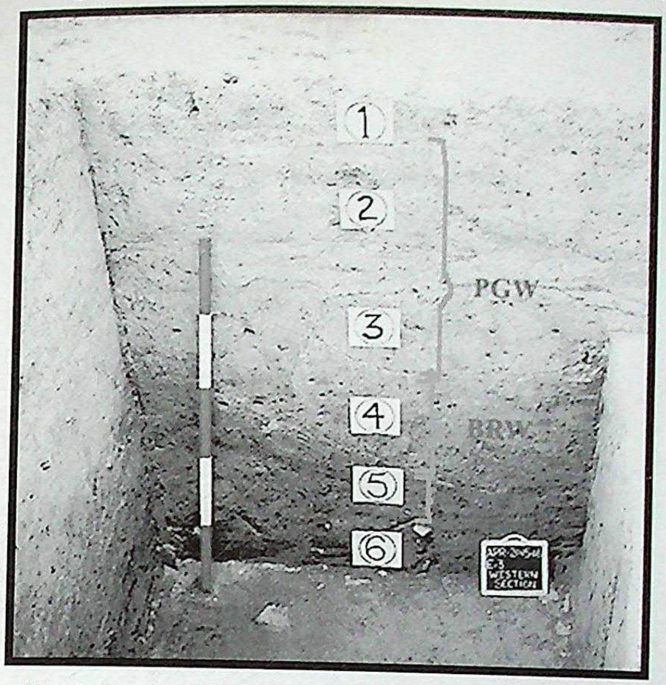
Illus. 16. Remain of Temple



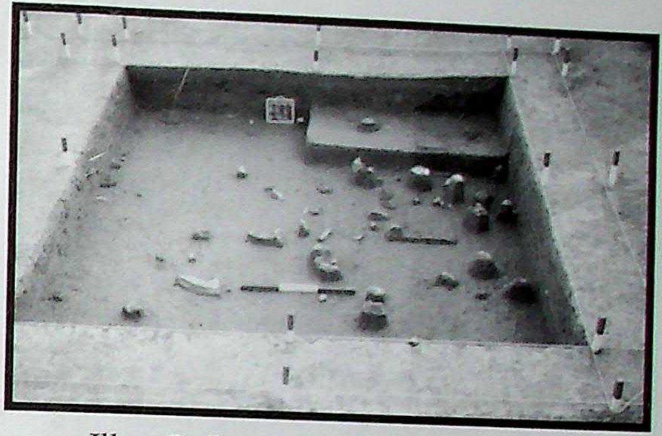
Illus. 1. Copper Hoards of Bisalpur


79°45
28°20'
Chaunsar Harduputti
PILIBHIT DISTRICT
Jallapur
Bhagawanipur
Karor
ABHAIPUR CHINA NAKTI
Nawadia
Chorra
Shahajahanpur Branch
BAREILLY DISTRICT
Mahadewa
Richholia
Mirpur Bahanpur
Deoha River
(Ferry)
Rajupur Kundri
Rapatua Nala
BISALPUR
RS
Kakra Khurdi
28°15
79°40'
79°45'
79°50'
Inches/miles

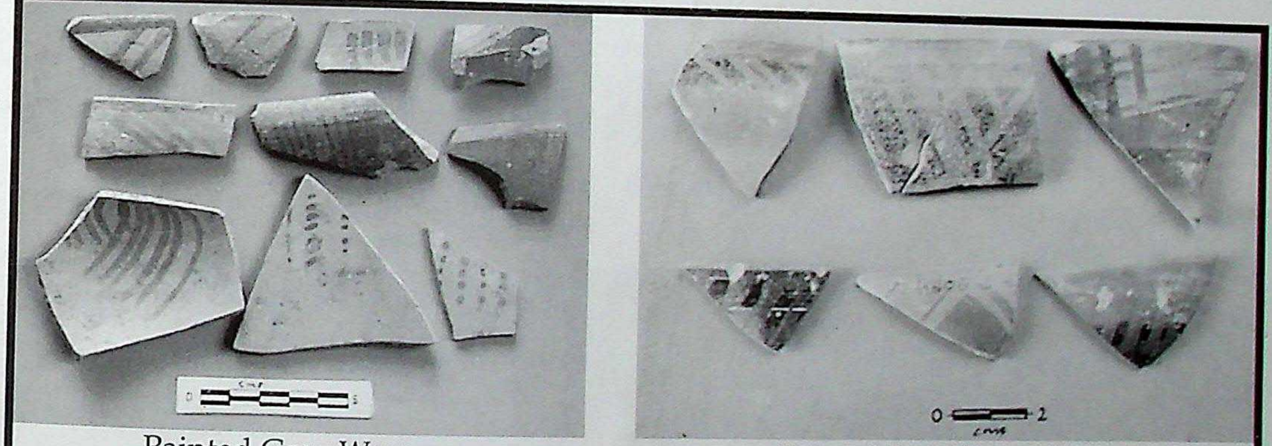
Illus. 2. Location map of site of Abhaipur


1
2
3
4
5
6
PGW
BRW
E3
WESTERN
SECTION

Illus. 3. Stratigraphy of northern section, Trench E3

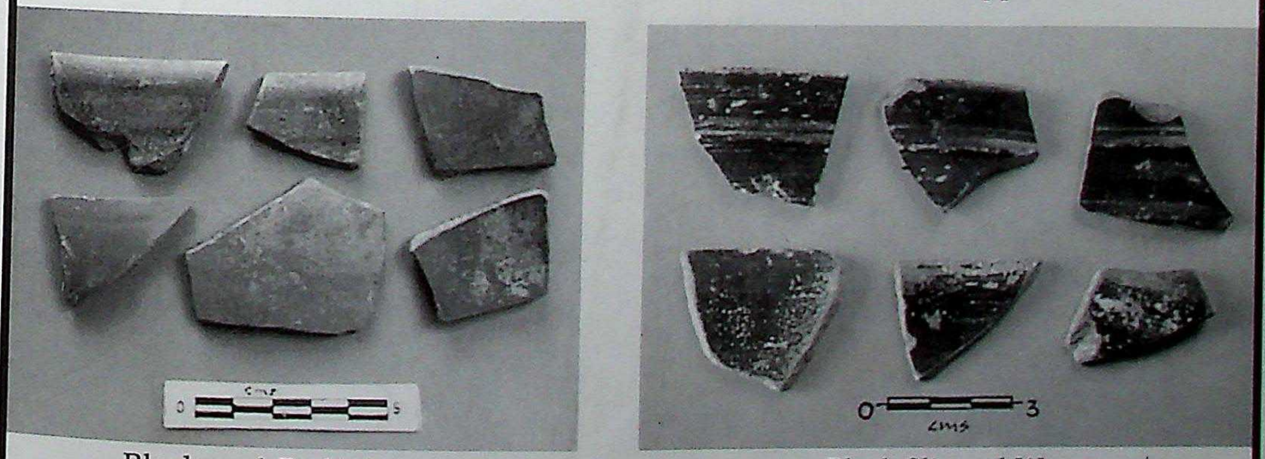


Illus. 5. Bone workshop, Trench E3


cms
0
5
0
2
cms

Painted Grey Ware

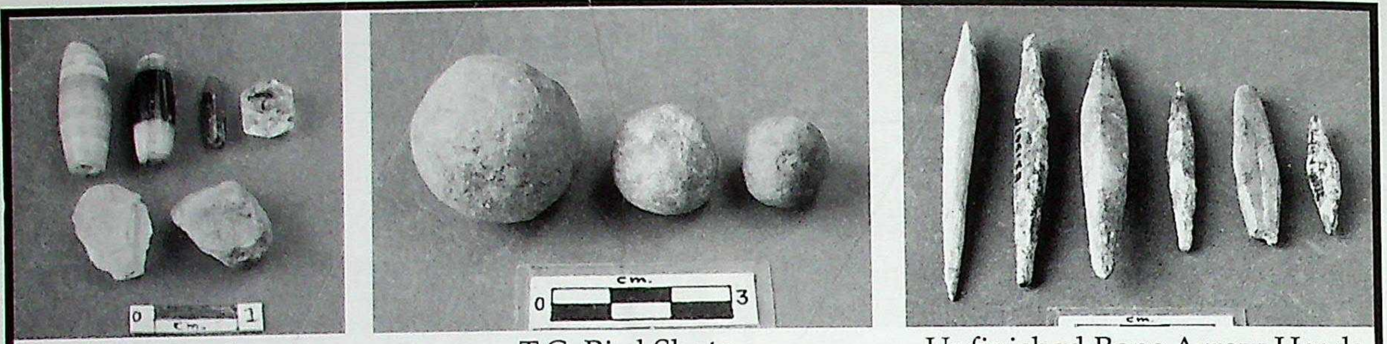
Painted Red Slipped Ware


cms
0
5
0
3
cms

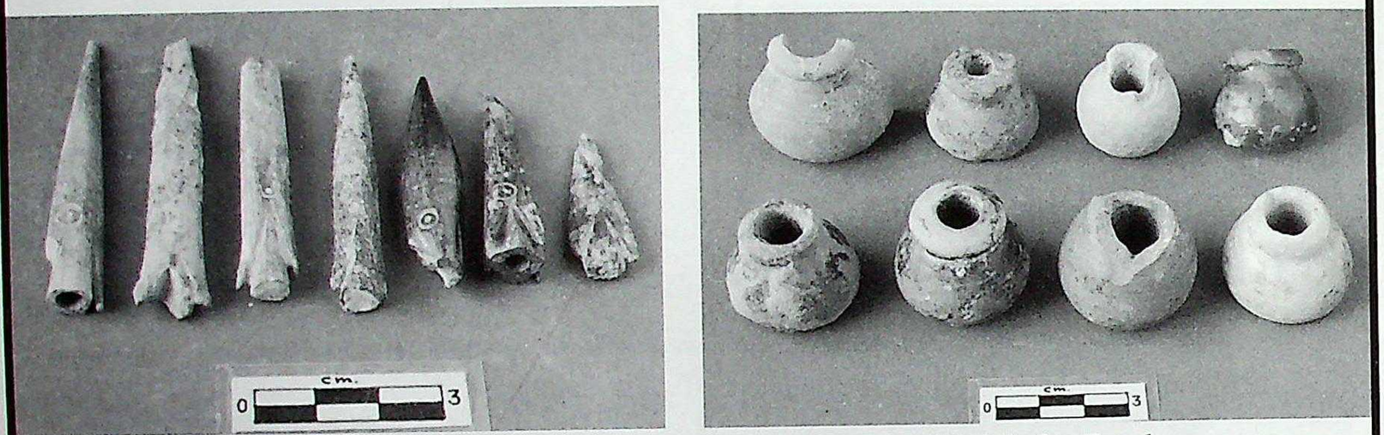
Black-and-Red Ware

Black Slipped Ware

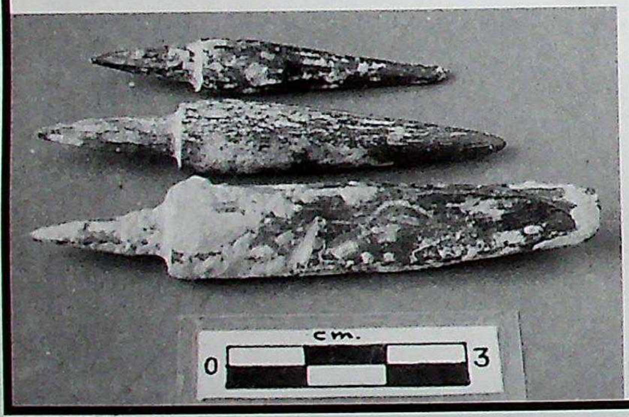
Illus. 6. Ceramics of PGW period


0 cm. 1
cm. 0 3
cm.

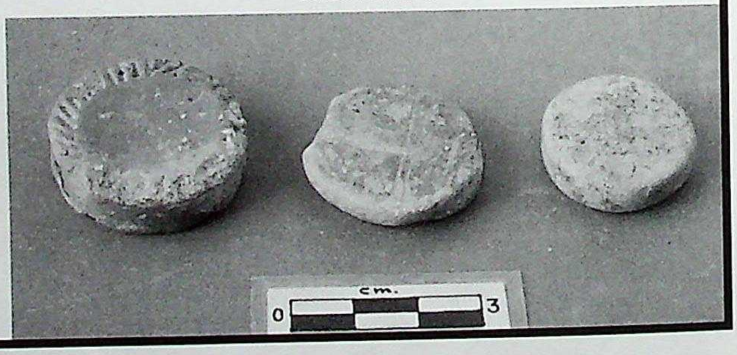
Stone Beads T.C. Bird Shots Unfinished Bone Arrow Heads



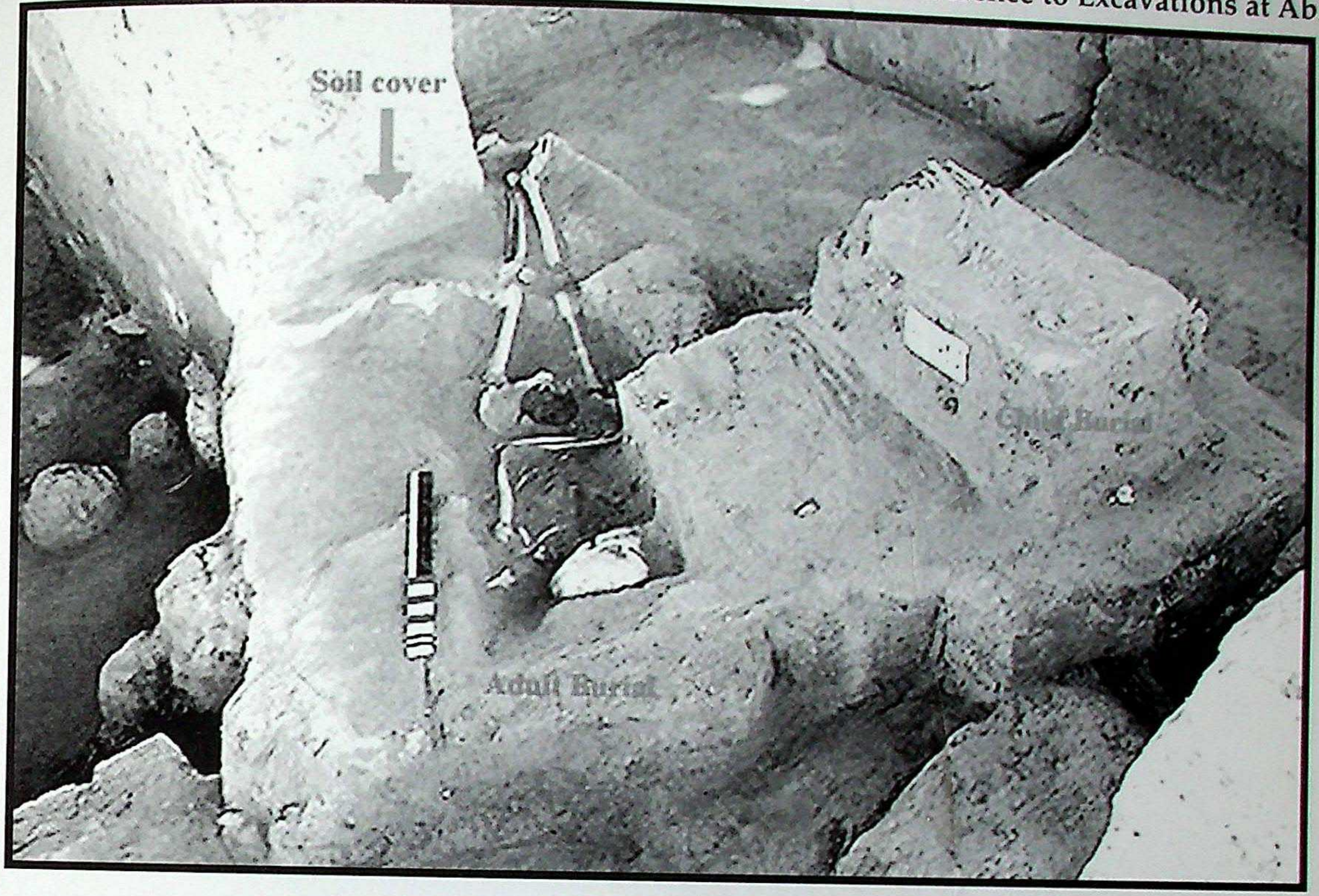
Bone Arrow Heads (Top & Bottom) T.C. Matka Beads



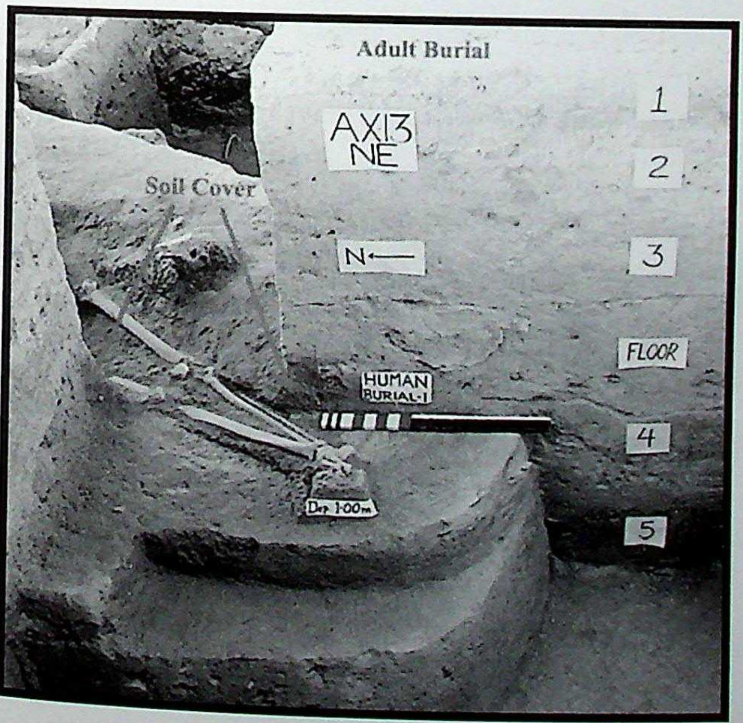
T.C. Disks



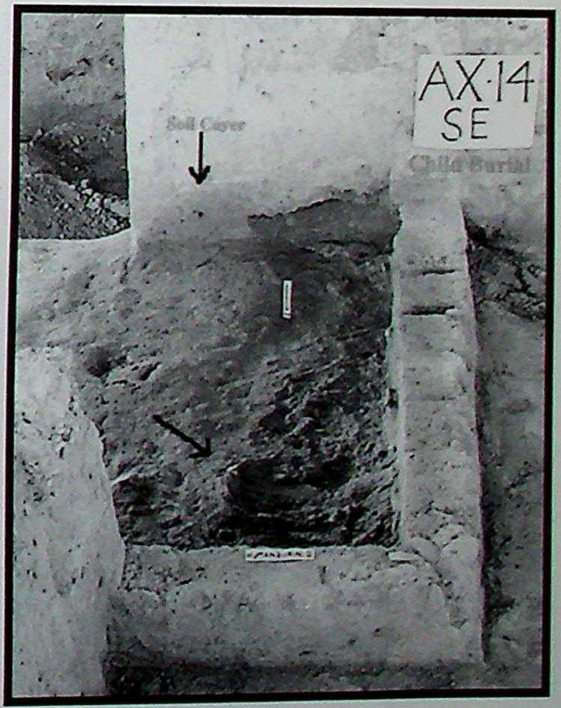
Illus. 4. Artifacts of PGW period


Soil cover
Child Burial
Adult Burial

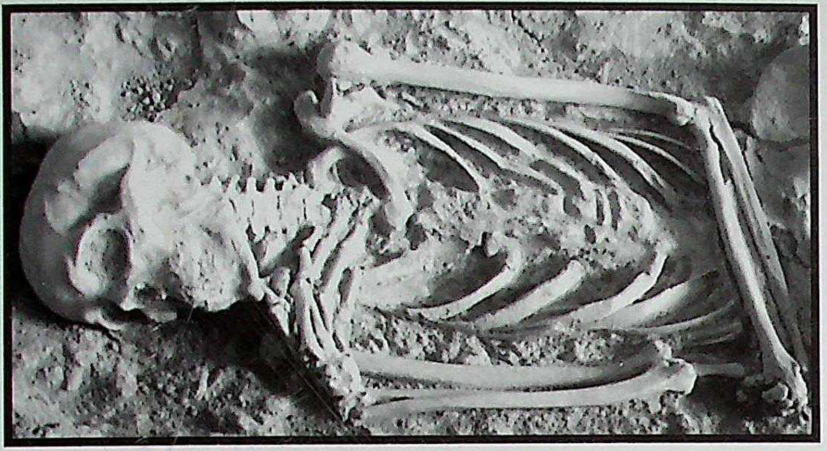
Illus. 7. Position of adult and child burials


Adult Burial
AX13 NE
1
2
Soil Cover
N←
3
FLOOR
HUMAN BURIAL-I
4
Dep 1.00m
5

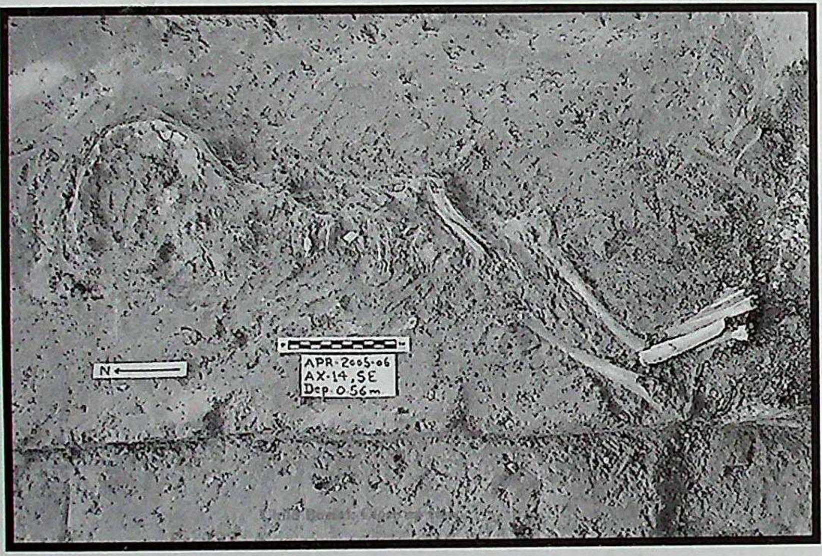
Illus. 8. Soil cover of adult burial


AX·14 SE
Soil Cover
Child Burial

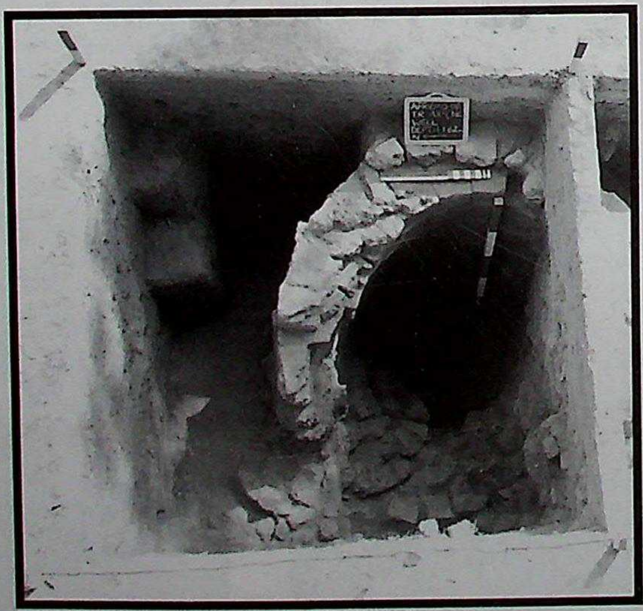
Illus. 9. Soil cover of child burial



Illus. 10. Close up of adult burial

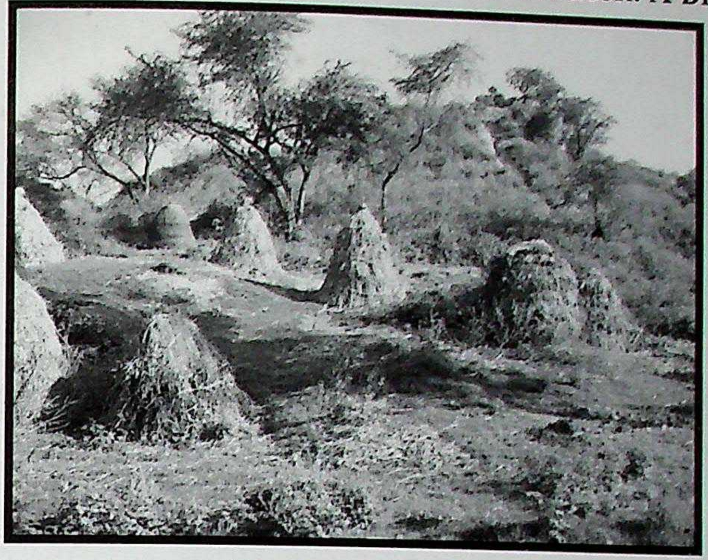

N
APR-2005-06
AX-14, SE
Dep-0.56m

Illus. 11. Close up of child burial

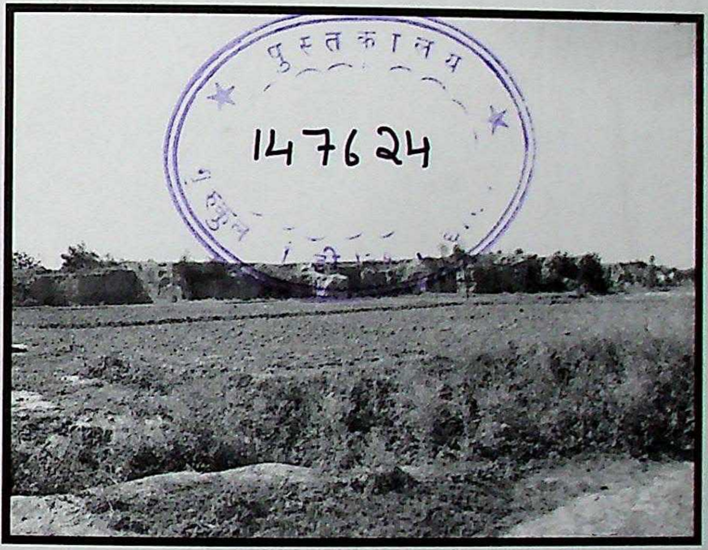


Illus. 12. Brick well of NBPW period

G.K. Lama
Archaeological Exploration in Western Uttar Pradesh: A Brief Report

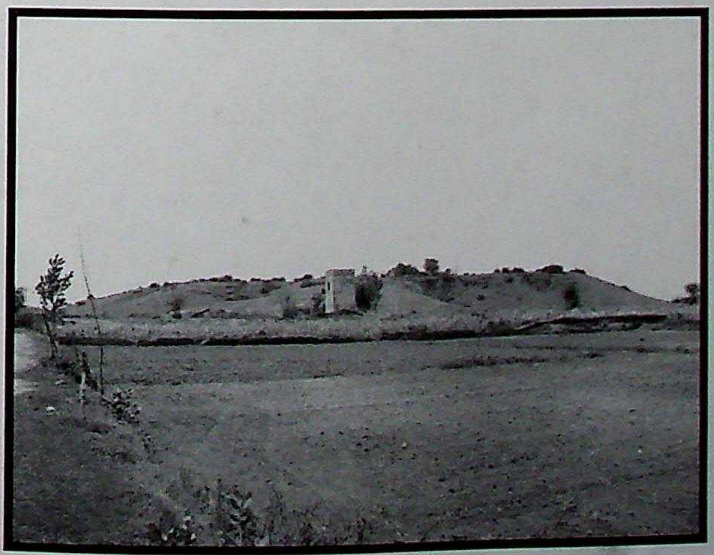


Illus. 1. General view of the mound at Alamgirpur, district Meerut



पुस्तकालय
147624

Illus. 2. General view of the mound at Sirsalgarh, district Baghpat



Illus. 3. Mound at Buland Khera, Gautam Buddha Nagar, Uttar Pradesh

GURUKUL KANGRI LIBRARY

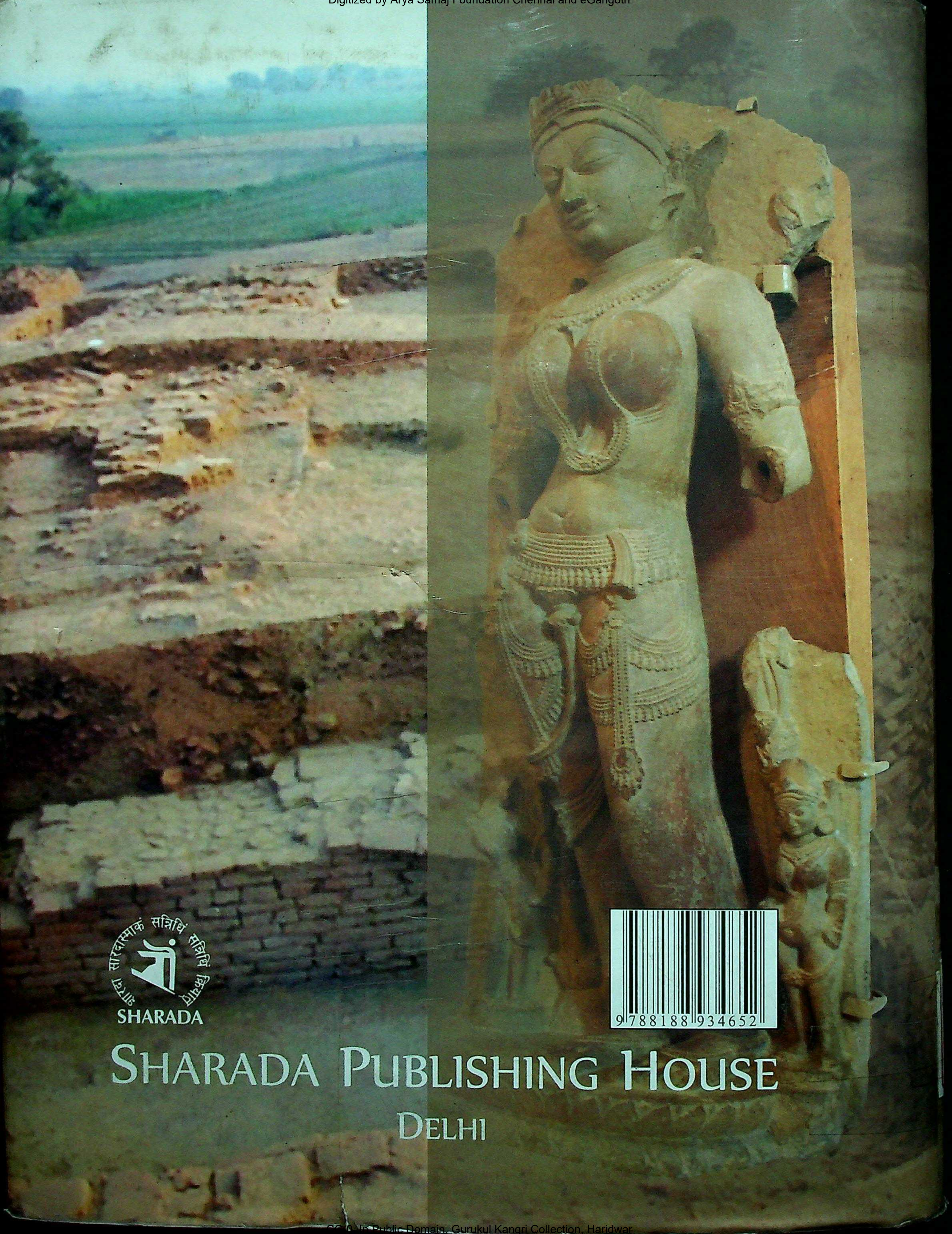
	Signature	Date
Accession		17/11/10
Class on		18/11/10
Cat on		〃
Tag etc		〃
Filing		
E.A.R.		〃
Any others		
Checked		

Recommended By........ डा. देवेन्द्र गुप्ता

Entered in Database

Signature with Date
17/11/10

STOCK VERIFY
2020
G.K.V. Library



SHARADA

9788188934652

SHARADA PUBLISHING HOUSE

DELHI